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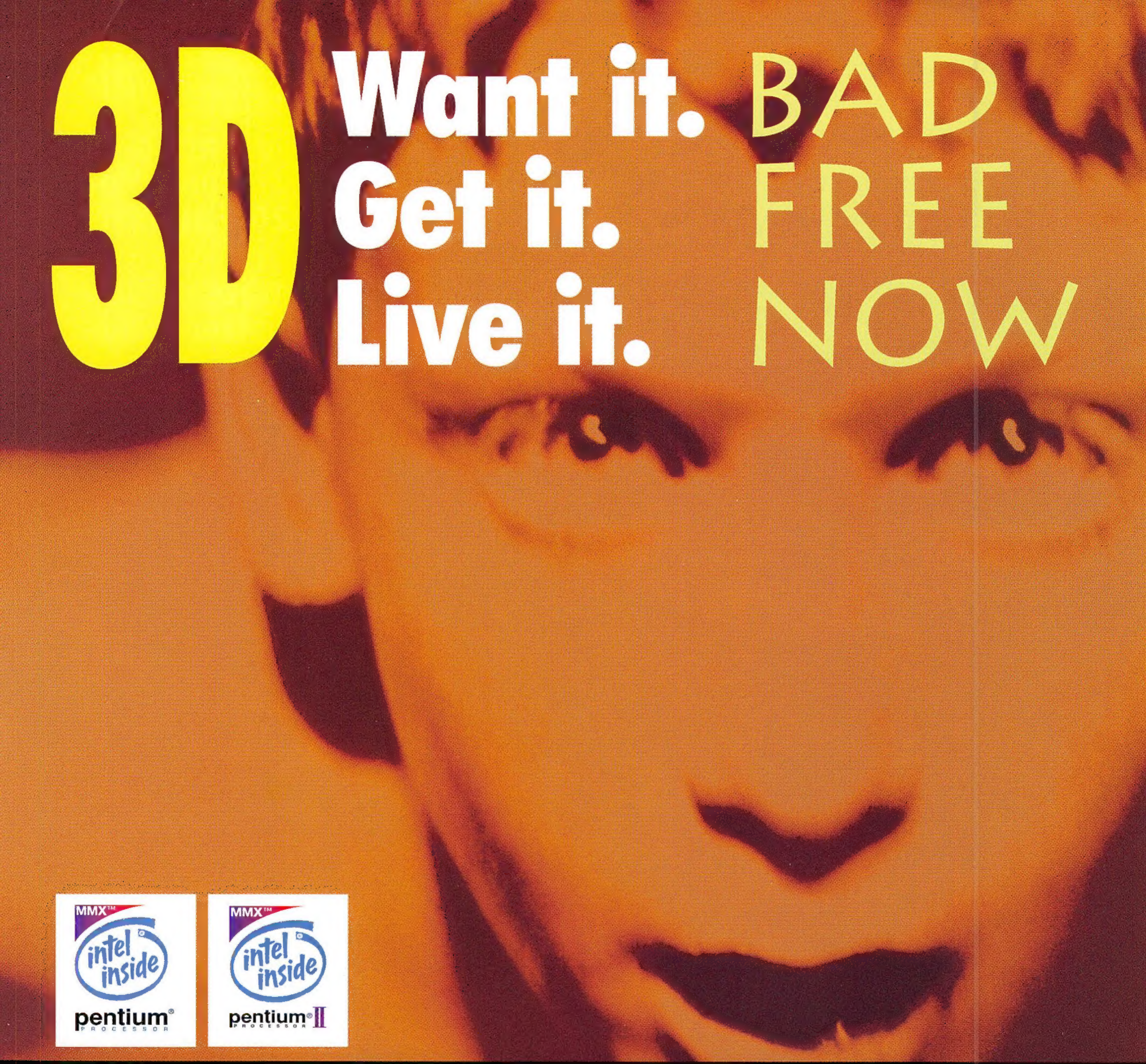

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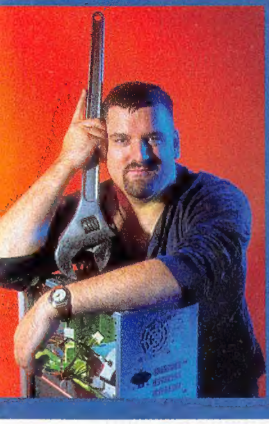


New tech city

Before anyone bombs me with letters about the DVD feature we promised in last month's mag—but mysteriously doesn't appear in this issue of boot—don't.

No need to call Robert Stack.

This is one of those things I mentioned a few months back: We get something breaking, and devote the pages to it instead. This time out, our ultra-sexy AGP cover story has snaked the scheduled DVD coverage (which will appear next month, promise.)

So what makes AGP so mouth-watering that we bumped mega-gig storage? Intel's new port puts the pedal to the metal for 3D accelerators caught in bus traffic. Gamers who have thirsted for higher res textures, game developers who have pleaded for more texture memory, and board makers who have balked at the high-cost of on-board memory will all dig AGP's ability to use main system memory for richer 3D graphics.

But *boot* isn't just about games.

A bunch of the *boot* editors just came from a great focus group session, and while the response was overwhelmingly positive, the biggest fear expressed by participants was that *boot* would become just another game magazine. Believe me, it won't. *boot* is dedicated to cutting-edge hardware and the mechanics who get off on getting under the hood, and tweaking those mean machines for max performance.

Of course every engine worth its ponies needs high-octane fuel, and the PC is no different. If you've got the megahertz, you aren't looking at spreadsheets or word processors to show off that silicon dream. You're talking killer apps that prove beyond a doubt that your PC kicks sand in other system's faceplates. And today's new breed of PC games shame all comers with technological breakthroughs arriving on a daily basis.

So. Do we love our 3D games? Yes. Is that all we love? No.

boot is, and will continue to be, about getting the best out of that lil' box on your desktop.

Brad Dosland
Editor in Chief

NEWS

16 bootWire ***News*** *that matters. The promise of* ***DVD-RAM*** *is imperiled by* ***squabbling*** *among all the* ***major players****. It seems that every company with two lab coats and a microphone demands its own standard. ALSO: An* ***up-to-the-minute*** *report on the real state of the explosive* ***Java*** *technology that* ***threatens*** *to smash Windows.*

Fast *Forward, page 31*

VOICES

25 The Saint *Alex St. John makes it* ***perfectly clear*** *that Java is* ***impotent*** *and no threat to Uncle Bill.*

27 Game Theory ***T. Liam McDonald*** *has been dallying in the* ***hottest technology*** *to ever hit gaming—****cardboard****!*

29 On the Line ***Shel Kimen*** *wants—nay* ***demands****—more burly* ***content*** *on the web, and she's got the tools to do it.*

31 Fast Forward ***Tom Halfhill*** *dreams of a PC that* ***rivals*** *the best machines made today, but his sports a* ***sub-$500*** *pricetag.*

120 Glitch ***Jon Phillips*** *is* ***worried*** *about you. You're spending* ***too much time*** *at the PC. Get up and* ***stretch*** *a little.*

DEPARTMENTS

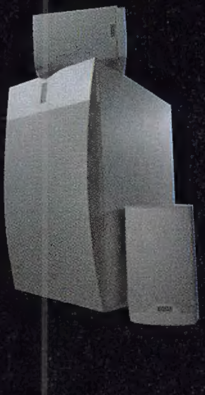
5 Comm Port *Readers air out the* ***buzz*** *via e-mail, fax, and postcards of pink.*

12 bootDisc *Your guide to the* ***joys*** *of our shiny silver platter. This month:* ***Resident*** *Evil, 7th* ***Legion****,* ***Terracide***

22 Pure Lust *Tech toys for* ***digital*** *girls and boys.*

62 12-Step *Installing* ***Linux*** *on Your Own PC: Are you* ***tired*** *of doing Windows? This month's* ***step-by-step*** *guide walks you through everything you need to know to install the* ***original*** *rebel OS:* ***Linux****. And we've provided* ***all*** *the software you'll* ***need*** *on this month's bootDisc.*

68 bootWorthy: Speakers *This collection of* ***satellites*** *and* ***subwoofers*** *will break the* ***sound barrier*** *on your PC wide open.* ***Prepare*** *to hear soaring highs and booming lows like you never knew your machine was* ***capable*** *of.*



bootWorthy: ***Altec*** *Lansing* ***ACS48****, page 69*

CONTENT

The **Logitech** Mouse**Man**, page 108

P/REVIEWS

76 Previews **Exclusive!** The first **hands-on** preview of the new 3D chipset from Rendition. The **Verite V2200** will impress you as much as it did us. ALSO: **Trespasser** will kick Jurassic; **Blade Runner** is looking for another skin job.

83 Reviews A **matching pair** of desktop and mobile **Sony VAIOs** come as close to **Kick Ass** as you can get without leaving **treadmarks** on the seat of your pants.

ALSO:

- Microsoft's new **Sidewinder Pro** would be a great joystick, even if it didn't support **force feedback**—but it does!
- A pair of high-flying flight sims—**EF 2000 v.2** and **iF-22**—are looking for a few good **wingmen**.
- How does a **mainstay 3D app** for the Mac fare on the PC? Check our **Ray Dream Designer** review for the skinny.

FEATURES

44 AGP: The Gamer's Edge

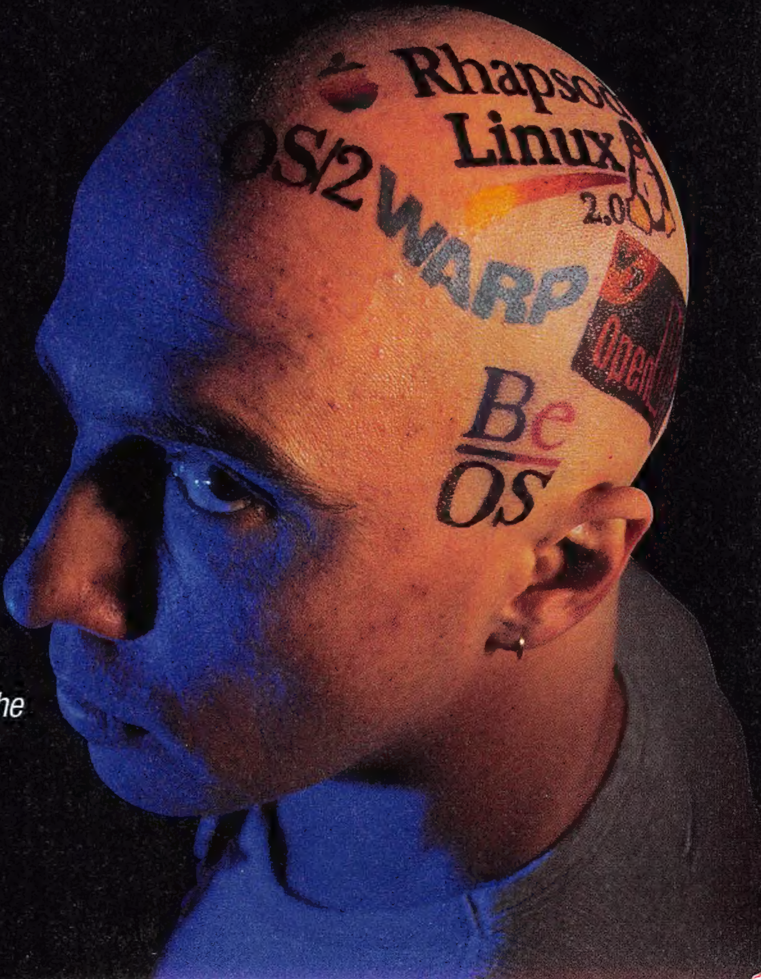
There's a **sexy new data bus** nestled within 440LX motherboards, and its expressly built for pulsating **polygon hysteria**. AGP means **gigantic textures** and **fast frame rates**. Roll bar and crash helmet **required**.

34 Lip: Scott Sellers

Part 2 of the interview with **3Dfx's VP of R&D**. Last month Sellers explained how 3D works; this time out he's kicking **ass** and naming **names**. PLUS: Sellers gives the scoop on 3Dfx's **next-gen** products, **Banshee** and **Voodoo 2**!

56 Stalking the Rebel OS

Windows? We don't need no **steenking** Windows! We've got the goods on five **alternative OSes** that run on Intel hardware, and flip a searing **birdie** at the Cult of Redmond.



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COMM PORT

The Dream Machine 97 cover feature appearing in our anniversary issue has conjured up record amounts of mail.

Everyone, it seems, has an opinion about our component choices. And everyone wants to know how to make their own machine post the stellar benchmark scores put up by the incredible Dream Machine. And everyone wants to win the Dream Machine in our little contest. As we went to press, the odds of winning were 1-in-5000. Pretty damn good, huh?

To make a dent in the mountain of mail we've received, we're devoting the first two pages of Comm Port exclusively to the Dream Machine this month. More of the deluge will be posted on the Comm Port section of the bootNet web site.

We like it black with just a little sugar...

As soon as I was able, I signed up for the contest to win the Dream Machine 97 (*boot* 13), and I'm giddy wondering if I might win it. What I'm trying to get at is how freaking happy I would be if I could win it. If I lived near your offices, I'd be there in the morning to say hello, and give you the best coffee in town. Please, please, please (trust me I don't normally beg) is there anything I can do to get me your child of PC obsession? I'll post a *boot* fan page at **http://users.atcon.com/~bobc/boot/**. Pure fan obsession about the best obsession: PC hardware.

Matthew Conrad

Modest Proposals

Dream Machine 97 was "absolutely marvelous." It made my almost-brand new computer seem, well, disconnected. You guys should really market that baby and sell similar configurations for a modest profit (hee-hee, do I smell Ferrari exhaust?). Whatever you do, don't sell it direct, though. Knowing us *boot* fanatics, we'd start referring to it as "bootie call."

Frank LaFontaine

If I sent you $5,500 would you build another Dream Machine 97 for me?

Sy

Executive Editor Jon Phillips replies: *You'll have to wait in line, Sy. We've received a daunting number of queries for custom-built dream boxes, and to tell you the truth, we're focusing on celebrity requests. We've already made a Lean Machine for Courtney Cox (only 8MB system memory; slim, flat-panel TFT), a Cream Machine for Eric Clapton (PCI sound card only plays late '60s blues jams), and a Baleen Machine for Captain Ahab (*Free Willy *screensaver installed on desktop). When time permits, we'd be happy to make a Sy's Wild Scheme Machine.*

Use Before Expiration Date

I've been scouting around for some time, looking for the ultimate PC, having figured that I would need to build it myself. I'm now considering building you Dream Machine 97, but I have a few questions.

First, how long will this technology feasibly last? I'm not looking to be top-of-the-line forever, but how long will it take before I start getting "Sorry, can't run this program due to the fact that your computer is a power-hungry hunk of crap" errors?

Second, what's with all the hype over the new intel 440LX chipset? Is it worth the wait?

Andrew Baran

Hardware Editor Andrew Sanchez replies: *Dream Machine 97 will withstand the year, at least until high-textured games requiring AGP and DVD-based content becomes readily available. With 64MBs of RAM, we think you'll find that* Quake II *and* Unreal *will rock on our system, as will* 3D Studio MAX 2 *and* Photoshop 4.

> Please, please, **please** (trust **me** I don't normally **beg**) is there **anything** I can do to get me your **child** of PC **obsession**?

The 440LX gets you AGP—that's the big deal. Toss in UDMA and SDRAM support, and this will be your preferred core-logic chipset for the P-II. As far as performance, take a look at the ASUStek motherboard review on page 48 for how well it performs against 440FX-based boards. You'll be impressed.

Crying Tears of Back-Up Blood

The Dream Machine is a fantastic bleeding-edge workstation with a great I/O system and huge storage capacity, but no tape backup! With the size and complexity of current operating systems, you're going to be crying tears of blood the first time you have a fatal registry corruption.

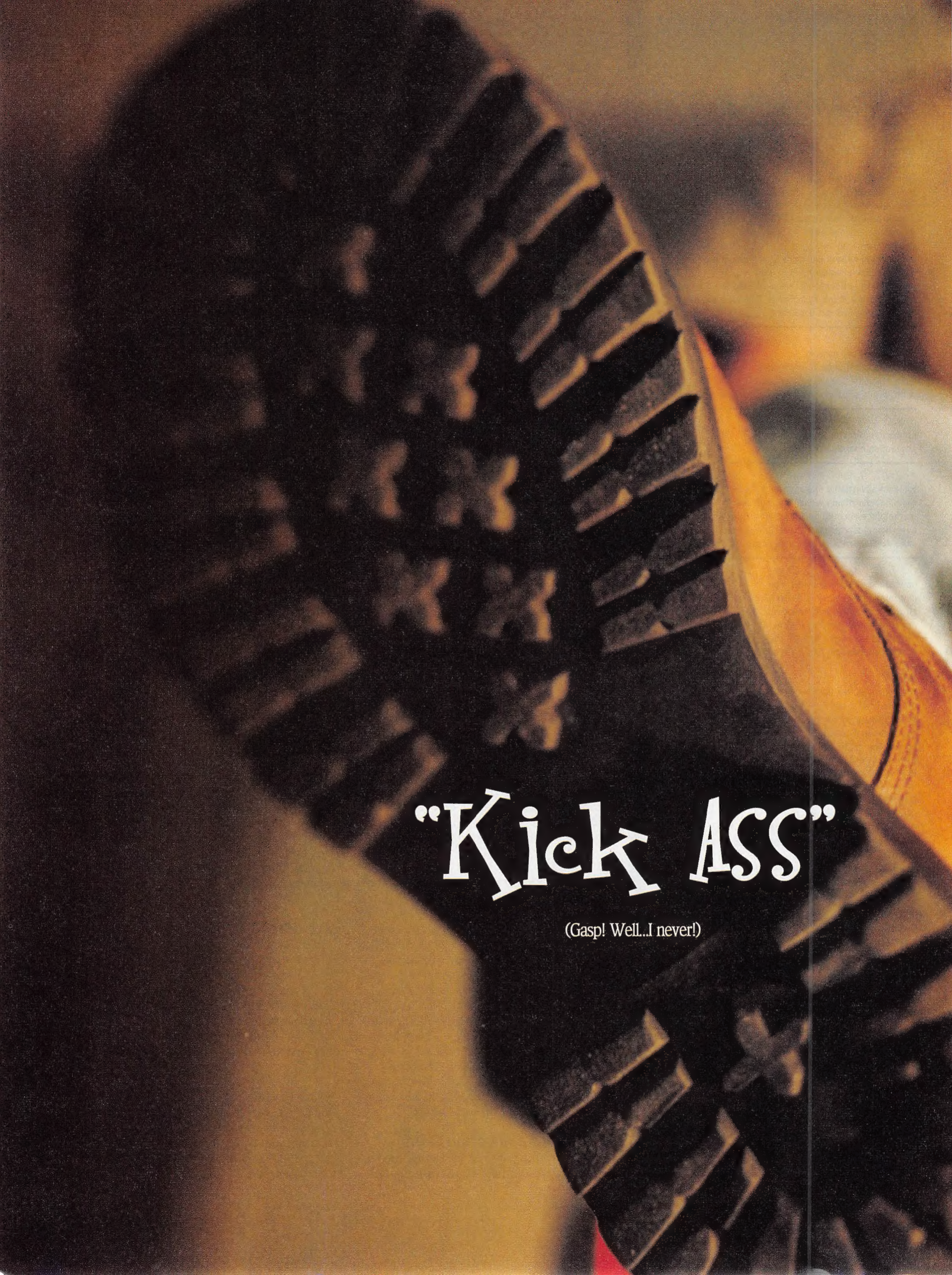
Leonard Miyata

Popularity Contest Means Zip

It's unfortunate that the popularity of the ZIP drive outweighed the technical advantage of the LS-120 in your Dream Machine 97. For the true PC enthusiast, popularity should come second to the technology. However, most consumers are not PC "geeks" and could care less about the technology. Of course, *boot* readers kick ass and should know better.

Roy Bowen

Editor in Chief Brad Dosland replies: *We love the LS-120, too, but when it comes to removable media, popularity does in fact matter. If you're sharing data, the Zip's huge installed base edges out the LS-120 when deciding on high-capacity cartridge drives.*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COMM PORT

Disabling ISA Creates Tingling Sensation

Great job with the magazine and web site. It's all wonderful, and makes me tingle! In your latest magazine with the Dream Machine, how does one go about disabling the ISA bus to increase the system performance by 10%? I want to make mine a PCI-only machine, but I don't know how.

Suna

Disc Editor Sean Cleveland replies: *There's no way to disable it completely, which is why you can only squeeze out 10%. First, remove all ISA cards from your machine. This alone will give you a boost as your machine will no longer need to waste time communicating with these slow cards. Second, adjust Latency Timer in your BIOS. You will want to raise the value to around 128, which in turn decreases response time with the ISA bus—which will have nothing in it anyway. If your BIOS does not allow you to change this setting (or if it does not even show it), you may want to check out a cool little app called* TweakBios, *which will give you complete control over those values that BIOS manufacturers usually hide. It works with a slew of chipsets and can be found at* **www.miro.pair.com/tweakbios/index.html**.

Compare and Contrast

How would you compare your Dream Machine 97 to the Micron Millennia XRU and to the Falcon Northwest machine? I am close to a purchase, and I trust you will supply an informative and honest answer.

Dennis Miranda

News Editor Bryan Del Rizzo replies: *The Micron Millennia XRU is such an excellent machine (and Kick Ass to boot!), it ultimately forced us to build an even better Dream Machine. And that's no small feat!*

However, as good as both machines are, there are some noticeable differences:

Price: The Millennia is priced at $4,439 almost $600 less than our stellar beauty. Motherboard: The boot *Dream Machine supports dual processors. The Millennia's 440FX doesn't. Video: We wouldn't be caught dead putting a ViRGE card in our system. Other comparisons: The Micron has DVD, but the Dream Machine has SCSI.*

In any case, both machines are killer.

As for comparison to Falcon Northwest's machines, you'll have to ask them. They seem to be afraid to send us any of their machines since we first reviewed one almost a year ago.

Runnin' on NT

How the heck can you build a $5,000 P-II system and run Win95 on it? You brag about squeezing 10% more performance out of the machine by keeping the ISA bus empty, but ignore the 30% to 40% boost a 32-bit OS like NT could give.

I'm running a P-Pro 200, and my WinMark score was 42, equivalent to a Pentium 166. I was puzzled until I installed WinNT 4.0. The same exact system now screams at a WinMark of 61!

Philo

Disc Editor Sean Cleveland replies: *The biggest reason was lack of support in NT for both the Diamond Monster Sound and Monster 3D cards, as well as hardware support for DirectX. Now if NT 5.0 were out...*

Last Chance for Win 3.1 Users

When I saw the Dream Machine 97, my mouth just fell open. But when I went to run the *bootDisc*, I saw it was 32-bit-only this month. I really wanted a chance to win the Dream Machine. What am I supposed to do now?

Joseph Gibson

Disc Editor Sean Cleveland replies: *We upgraded the* bootDisc *to* Director *6.0 to take advantage of updates and added functionality (such as MMX support), and were unaware Win 3.1 users were no longer supported in the interface.* bootDisc 15 *(in this issue) has 16-bit support along with a re-run of the Dream Machine Contest. Just make sure that you enter before Halloween!*

Hard-Core-Logic Decisions

I hope that you update the Dream Machine 97 to replace the motherboard with a version that has an LX chipset, once such products finally appear. It was ridiculous for Intel to market the Pentium II without a chipset optimized for the new processor, and by the time you actually award the Dream Machine 97 to some lucky person this December, the FX chipset will be obsolete for P-II systems. When you design a dream system, the chipset is as important as the processor. While I recognize that you didn't have much of choice this year, please consider the chipset when designing the '98 Dream Machine.

Jim Robertson

Hardware Editor Andrew Sanchez replies: *We were stuck between a rock and a hard place with the choice of core-logic chipsets. At the time we were working on the feature, AGP was still a good two months away. Trust us, we banged on every motherboard makers door, demanding AGP. But none were ready for benchmarking or exhibition.*

The core-logic chipset was, and will always be, considered for any future Dream Machine.

Letter From Saint NIC

You guys blew it. All that horsepower and you forgot to put in a NIC. How are you supposed to make your colleagues *Quake* in their boots if you can't get on the LAN?

David J. Smith

Editor in Chief Brad Dosland: *We debated whether to include a network card, and ultimately decided it was a peripheral that those mechanics with LAN access could upgrade to on their own. Everyone else will have to be content to make their colleagues* Quake *over the Internet.*

A Hot Time in the Ol' Case

Your Dream Machine 97 uses a Dual CP-Vue monitoring device. The guys at Tiger Direct can't get this particular peripheral. Any more info you could give me as to where I could purchase one would be greatly appreciated.

John Dyck

Software Editor Sean Downey replies: *Quad-G Electronic manufactures the CP-Vue and has a web site dedicated to it,* **www.cpvue.com**. *By the time this issue hits the stands, the CP-Vue should be available in CompUSA, as well as the PC Zone and PC Mall.*

Sub-$400 Stinger

Where did you purchase the Dream Machine's Micropolis Stinger UW SCSI drive for under $400?

Scott Perla

Software Editor Sean Downey replies: *The Stinger was originally shipped to us directly from Micropolis, although it can be ordered from a number of online sources, including NECX (800.808.3375), Computer Quick (415.861.8330), and the Internet Shopping Network (800.677.7467) for under $400.*

Fastvid Makes Vid Fast

You stated that *Fastvid* will boost the graphics even further on the Dream Machine, but the web site for *Fastvid* says it won't improve a Monster 3D. So who's correct?

Efrain Figueroa

Hardware Editor Andrew Sanchez replies: FastVid *bumps up 2D functionality, not add-in 3D hardware, so the company is correct in saying* FastVid *won't help the Monster 3D. Our benchmark score is always for vanilla DOS* Quake*—not the accelerated version.*

The $2K Daydream Machine

I enjoyed your Dream Machine 97 article, but anyone could come up with a Dream Machine for $5,000. A more useful article would have been a $2,000 computer with your recommendations on the motherboard, graphics board, speakers—stuff we consumers have access to without buying. It's nice to dream—but I'd rather see something within my reach.

Troy Minor

Ya Gotta Pay to Play

I just read the fine print on your secret online Dream Machine entry form, and was perplexed to find that you were basically trading this machine for a child. While I have heard of people going a long way to acquire a child, I have never heard of this angle before. You do know that there is a black market where you can "acquire" a child that suits your taste. You might actually even save some money with this option. And we all know that money saved is money spent on the truly important things in life (like a 9.1GB SCSI hard disk or a 21-inch .25 dot pitch monitor).

Scott Tar

Why merely possess a game when you can OWN IT?

Simply put, games are meant to be dominated, not merely played. And though practice may eventually get you to perfection, the Microsoft® SideWinder® Precision Pro will get you there a lot quicker.

And with the new ergonomically designed stick, buttons are at your fingertips and right under your thumb. You know, the same place you wish your games were.

With Microsoft SideWinder Precision Pro you get:

- patented digital-optical technology
- unbeatable accuracy and reliability with no actual wear and tear
- shift button to double functions
- map specific keystrokes, maneuvers, and strings
- 30 pre-loaded game profiles
- on-handle rotation control

Microsoft

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Precision Pro

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Whither MMX2?

In the *boot* 12 Tracking Sheet, you said MMX 2 was coming Q1 '98. But *PC Computing* said MMX 2—code named Katmai—was coming out the end of 1998. Who's right?

Josef Tor

Hardware Editor Andrew Sanchez replies: *When we first heard about MM2, it was coming in Q1 of '98. But, like all new technologies, that date has slipped quite a bit.*

Intel reps haven't even "officially" confirmed the existence of MMX2, but if any new technologies were to come out, we wouldn't expect it until Katmai.

And with Deschutes/Slot 2 coming in Q3 of 1998, we doubt Intel will saturate its high-end market by shipping Katmai in 1998. Our best estimates place Katmai/MMX2 in 1999... if we're lucky.

> Come on ! **Who** would go out and spend **$12K** on a piece of proprietary **junk** with a **proprietary** OS just to play GLQuake?

Pocket Fishing for Info

You do a fantastic-oh-my-gad-I'm-gonna-blow issue (*boot* 11) on third-gen 3D chips and weeks later, ATI serves up Expert@Play, based on the Rage II. It sounds dynamite but hey, the Lords of Tech at *boot* beg to differ.

Does the Expert@Play reek of dead fish, or are you saving it for another jeez-what-the-hell-are-you-doing-in-the-bathroom-again round-up?

Seraphin

Tech Editor Chris Dunphy replies: *We just got an ATI Xpert@Play and will be reviewing it in the December issue. It's powered by the Rage Pro, not the year-old Rage II. Our first tentative sniffs have revealed no fishy odor, and a few stunning surprises. The 2D and 3D speed seem to be well into the "good" range, and the DOS VESA 2.0 speed absolutely screams, faster than any other card we have ever seen, nearly doubling the speeds we're used to seeing in Quake at 800x600 in DOS. Stay tuned for all the details next month.*

Just Because It's Sooo Sexy

Great review on the SGI machine (*boot* 13). I liked it so much, I went out and bought two! And I'm now working on the sequel to *Toy Story*! Come on ! Who would go out and spend $12K on a piece of proprietary junk with a proprietary OS just to play *GLQuake*? Don't get me wrong, SGI machines are great for rendering and such for movies. However, I'm sure the larger populace will never even get to see one, let alone afford one. If and when I might be able to own one, what the hell would I do with it? One thing I like about boot is the practical reviews of the hottest hardware... the stuff myself and most people can afford. Why waste two pages reviewing a machine that less than 1% of the users will ever use? Seems like a waste of space to me.

Jo'el Pool

Shifting Out of OverDrive

I'm trying to decide whether to get a Pentium 233MHz or a newly released 166 to 200MHz MMX OverDrive. My Tyan S1572 motherboard supports Pentium MMX (up to 233MHz), including Intel's OverDrive chips. Is the actual Pentium MMX chip faster than it's OverDrive cousin? Which is more expensive?

PeVKoss

Hardware Editor Andrew Sanchez replies: *Go for the genuine Intel MMX chip, especially if your motherboard supports MMX out of the box. The Overdrive chip contains an onboard voltage regulator, which cost more to manufacture. Thus, Overdrive chips will be expensive as feck compared to similarly clocked counterparts. As far as speeds are concerned, the Overdrive chip, in theory, should work identically to its similarly clocked cousin.*

Kali Vs. The Code Whores

Kali was my first experience with Internet gaming. I thought I had a good thing going, then I noticed people in the chat area using terms such as "reboot city", "!@#$% Kali", etc. to describe the service. As a newbie, I couldn't understand their concerns, until I tried another service. Then I discovered the problem with Kali. When I e-mailed their tech support regarding cheaters, horrible lag problems, and constant disconnects/crashes, I received a worthless reply, and some sections from the Help file, none of which addressed the problems I described. When I replied that the response was not helpful, they copped an attitude and actually recommended I use another service! I was advised to request a refund, and they claimed my problems were unique, and they had no idea what a "Code Whore" was.

How would you feel if you went to Burger King, found worms in your Whopper, complained, and were told maybe a Big Mac would be better for you?

Mallory D. Lawrence

Kali President Jay Cotton replies: *It always hurts to see that we've somehow failed to provide someone with the solution they need, but we keep trying.*

We process hundreds of requests for help or information each day, and although some responses are pre-written, a real person with years of experience reviews each message. Given the huge assortment of hardware and software available for today's PCs combined with the various Internet connectivity options, almost ever user has a unique setup and might have unique problems.

We offer a wide variety of games on Kali. Unfortunately not all of these have the same performance requirements. Some run well for everyone while others require faster machines or faster Internet connections. If an AOL user wants to play Duke Nukem *or* Doom *he might be disappointed in the game's performance, but another user on a 33.6 modem connected to a high-speed ISP will probably have a great time.*

As Internet gaming matures, everyone is realizing the problems associated with cheating. Not all games are susceptible to cheating, but if the game you want to play can be hacked to allow cheating, you won't be happy when someone blasts you with a weapon that shouldn't be available or spends money he didn't earn.

As a gaming service we can't stop the cheating ourselves, but we've strictly forbade cheating and have taken steps to reduce it when we can. We don't allow users to distribute cheat files over Kali and our software carefully checks each user's copy of the game when they join game lobbies.

We sign up over 250 new users every day and occasionally a customer asks for a refund after we've failed to solve their problem. We're always disappointed when this happens.

Mystique/Monster Update From Heather Walton

I'm updating my letter that appeared in *boot* 13. I still love my Mystique, but I have to agree with you that the 3Dfx is awesome, at least with the new *GLQuake* version .95. My problem was the 3Dfx Monster card itself. We returned that one and bought another one when *GLQuake* v.94 came out, and man! What a difference! Now we know what all the hype is about! My Shambler friend not only looks better, but he pops out at me in pure 3D, and my bootmark is 35fps, compared to 16fps on *WinQuake* with my Mystique. That is one incredible card to double the frame rate plus add so many 3D and lighting effects with gorgeous colors!

My husband and I are still very pleased with our Mystique in 2D Windows and DOS, but we also love our Monster 3D card, especially in *GLQuake*!

In fact, when we completely rebuilt our Pentium 120 to a new M-Tech HX chipset motherboard with a Pentium 200MMX, we didn't see the huge difference we saw with our two video cards. There really are only a handful of quality games out there, as Liam McDonald wrote about in Game Theory in *boot* 13. What really matters is that the games we love the most, and it's *Quake* for me, run and look the best they can on our systems. People who subscribe to boot know how to set-up their systems and want the best and fastest they can afford. I couldn't be happier with my computer, especially since I rebuilt every component myself, and am very pleased with how my games run. Isn't that the whole point anyway?

Heather Walton

Rock & Roll isn't dead.

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They don't make music like they used to, which is why we're introducing Easy CD Creator™ Deluxe Edition software. Now you can enjoy the power to clean up your old albums and record your own personal compact discs. It's loaded with features that let you professionally digitize your music with any of today's CD Recordable drives. Dust off your old LPs, dig out your old cassettes, and let Easy CD Creator remove pops and scratches to uncover stunning clarity. Then immortalize it all on CD. You can even transfer photos, scanned images and Internet graphics to your personal CD. Or back up your hard drive and store important files. It's easy with Easy CD Creator Deluxe Edition. Order yours today. And start digitizing your records. Because they don't make music like they used to.

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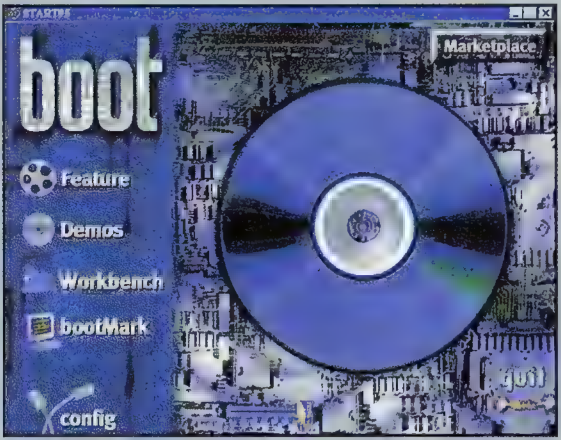
Our software is designed to assist you in reproducing material for which you own the copyright or have permission to copy from the copyright owner. *Suggested retail price U.S. dollars, subject to change without notice.

Product Information Number 87

The bootDisc is compatible with Windows 3.1x, Windows 95 and Windows NT versions 3.51 and 4.0.

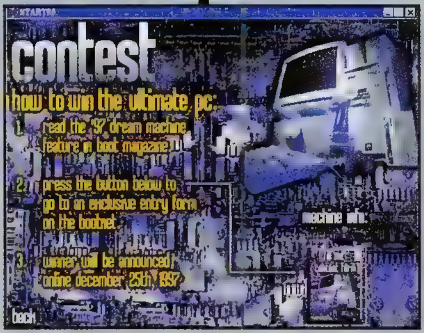
Launching from Windows 3.1x: Launch the File Manager, click on your CD-ROM drive, and double-click the Start31.exe file.



TRY IT ON THE DISC

Launching from Windows 95 and NT: Place the disc in our CD-ROM drive and the menu will pop up. You will have the option of entering or launching the Explorer to view the contents. If it doesn't pop up, open your Explorer via the Start button, click on your CD-ROM drive letter, and double-click the Start95.exe file.

ON THIS MONTH'S DISC:



contest

how to win the ultimate pc:

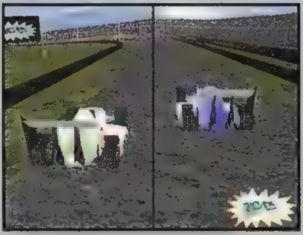
1. read the '97 dream machine feature in boot magazine 13
2. press the button below to go to an exclusive entry form on the bootnet
3. winner will be announced online december 25th, 1997

We are offering those who were unable to enter the Dream Machine contest back in boot *13 another chance to win the coveted system. Click on the middle of the rotating disc in the main interface to find the secret screen that will take you to a classified page on the bootNet web site for your chance to enter the contest. Just make sure to enter before Halloween!*

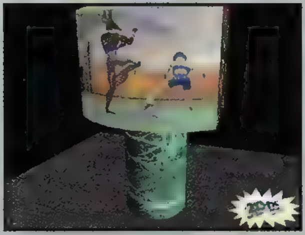
EVERY MONTH, BOOT DELIVERS OVER 600MB OF THE HOTTEST DEMOS AND COOLEST APPS

3DFX DEMOS

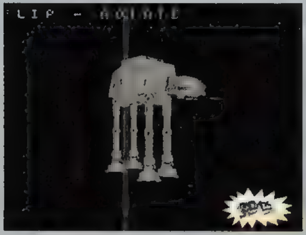
Showcasing the power of the hot, hot, hot 3D chipset. Each demo requires a 3Dfx Voodoo Graphics or AT3D+ Voodoo Rush-based board, and Glide drivers 2.4 or greater. From the folks at 3Dfx.



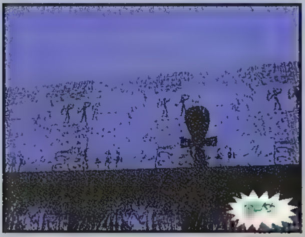
ATB Indy Racing 3Dfx Demo: Polygon racing madness! Dig the split screen to compare non-3Dfx to 3Dfx functionality. Read the readme.txt file located in the 3Dfx\ATS_Flip directory for keyboard commands.
Requirements: Win95, 16MB RAM, 5MB hard disk
Location: 3dfx\race\setup.exe



ATBTV 3Dfx Demo: Designed to show off animated textures and simple lighting styles. By default, ATBTV loads all of the 3DF files found in \movie and displays them on the TV in numerical order. If you have other 255x255 3DF files, you can display these as well by passing a command line parameter to atbtv. For example: atbtv.exe ..\mymovie*.3df. Can be run keyboard only. Does not use a joystick or sound.
Requirements: Win95, 16MB RAM, 14MB hard disk.
Location: 3dfx\ats_flip\setup.exe

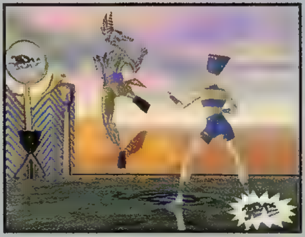


ATS Flip 3Dfx Demo: This program "flips" models of several different file formats. Look to the readme.txt file located in the 3Dfx\ATS_Flip directory for keyboard commands. Cursor keys rotate the models.
Requirements: Win95, 16MB RAM, 5MB hard disk.
Location: 3dfx\ats_flip\setup.exe

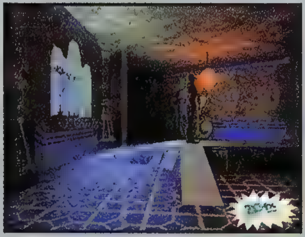


Demo Room 3Dfx Demo: Shows off multipass projected textures. The projected textures consist of mono color images, true color images, and animated images. You'll also see very high-frequency textures showing off the importance of mip-mapping and bilinear filtering. Look to the readme.txt file located in the 3Dfx\Demoroom directory for keyboard commands.
Requirements: Win95, 16MB RAM, 19MB hard disk.
Location: 3dfx\demoroom\setup.exe

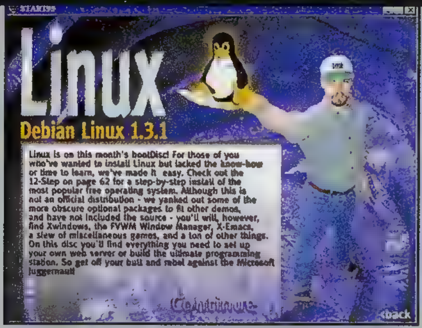
Grand Bleu 3Dfx Demo: Underwater demo demonstrating texture multiplications to render water-reflection effects. Look to the readme.txt file located in the 3Dfx\GrndBleu directory for keyboard commands.
Requirements: Win95, 16MB RAM, 27MB hard disk. If you have less than 32MB memory, soundtrack may not load. In that case, start with the -nosound option.
Location: 3dfx\grndbleu\setup.exe



Valley of Ra 3Dfx Demo: An example Arcade Toolbox program. Arcade Toolbox is a set of libraries for rendering library, input and scene management. The ATB rendering library resides on top of Glide. Look to the readme.txt file located in the 3Dfx\Wiz directory for keyboard commands. Help screen via F1 key.
Requirements: Win95, 16MB RAM, 6MB hard disk.
Location: 3dfx\valleyra\setup.exe

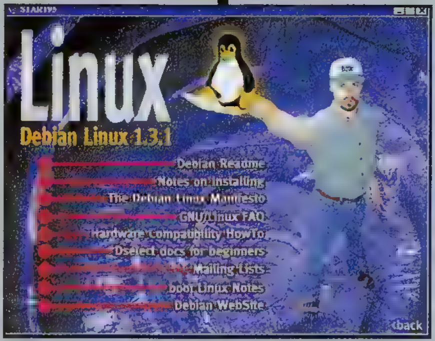


Wizard's Tower 3Dfx Demo: WIZ demonstrates the use of lighting maps to produce high-quality textured environments. Five rooms to explore. In the first room, flying bats and warriors wander around and shoot at you. Shoot back, and they explode after three hits. Bats and warriors are reborn as bats.
Requirements: Win95, 16MB RAM, 21MB hard disk. Supports multiplayer mode and basic sound.
Location: 3dfx\wzrdstwr\setup.exe



Linux is on this month's bootDisc! For those of you who've wanted to install Linux but lacked the know-how or time to learn, we've made it easy. Check out the 12-Step on page 62 for a step-by-step install of the most popular free operating system. Although this is not an official distribution - we yanked out some of the more obscure optional packages to fit other demos, and have not included the source - you'll will, however, find Xwindows, the FVWM Window Manager, X-Emacs, a slew of miscellaneous games, and a ton of other things. On this disc you'll find everything you need to set up your own web server or build the ultimate programming station. So get off your butt and rebel against the Microsoft Juggernaut!

Linux—the "People's OS"— is on this month's bootDisc! Check out the 12-Step on page 62 for a step-by-step install of the most popular free operating system. Although this isn't an official distribution—we yanked out the more obscure optional packages to save disc space, and have not included the source—you'll find Xwindows, the FVWM Window Manager, X-Emacs, a slew of miscellaneous games, and tons of other goodies. Set up your own web server, build the ultimate programming station, and get off your butt to rebel against the Microsoft Juggernaut!



All the Linux information you need is right here. Used in conjunction with this month's 12-Step, these files will help you become a Linux guru who even Linus Torvalds would be proud of!

7th Legion: Real-time action/strategy game with an emphasis on battle instead of micromanagement. Graphics are high-res 8- and 16-bit; supports MMX. Effects include smooth lighting, night missions, and fog. Received a boot kick-ass!
Requirements: Win95, Pentium 90 or faster, 16MB RAM, 69MB hard disk. Multiplayer not included in demo. From Microprose.
Location: 7th-legn\setup.exe

LOSE YOUR MARBLES

Lose Your Marbles: Marbles start to drop. Your collection keeps getting bigger. Work fast to line up three, four, or five matching marbles to make them disappear. Five in a row eliminates the entire row and dumps more marbles on your opponent.
Requirements: DOS, Win3.1 or Win95; Pentium 60Mhz, 8MB RAM, 18MB hard disk. From Segasoft.
Location: store\marbles.exe

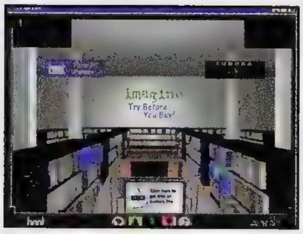
RESIDENT EVIL

Resident Evil: The Playstation legend finally ported to PC! Work your way through a secluded mansion, and deal with the disgusting results of top-secret biotechnic experiments. Everything is quiet... too quiet. Supports Matrox Mystique, Diamond Monster 3D, Orchid Righteous 3D, Creative 3D Blaster, Canopus Total 3D and the Intergraph Intense 3D 100.
Requirements: Win95; Pentium 166, 16MB RAM, 30MB hard disk. If your machine has only 16MB RAM, demo will require100MB hard disk. From Virgin Interactive.
Location: checker.exe

Terracide: Play the game used by *boot* to benchmark 3D video cards! Contains native support for 3Dfx, Rendition, S3 and ATI, along with a 16-bit dynamic lighting model, fogging, liquids, translucency, reflection-mapping and alpha blending in and out. *Terracide* is an atmospheric 3D sci-fi shooter encompassing exploration, frantic combat, and even puzzle-solving.
Requirements: Win95; DirectX; 16MB RAM, 20MB hard disk; 3D video card recommended. From Eidos Interactive.
Location: teracide\setup.exe

Web Snake: Off-line browser designed for Windows 95/NT. Uses proprietary "intelligent pull" technology to search and retrieve files from the Web. Supports site mirroring (including directory structure), retrieval of e-mail addresses, site maps and advanced file search.
Requirements: Win95; 486/33Mhz, 8MB RAM, 5MB hard disk. Evaluation software expires 30 days after installation. From Anawave Software.
Location: websnake\setup.exe

TRY BEFORE YOU BUY SOFTWARE STORE



Introducing boot's new Try Before You Buy software store. Each month, we include on the disc full versions of games and utilities. Try the demo, and if you like it, you can purchase the software, and unlock the full version using a simple interface on the bootDisc. (Some "wrapped" products require payment prior to use, but we try to keep them to a minimum).

To try before buying, click on the Software Store Banner on the main bootDisc page, and follow the instructions. We guarantee that this software is definitely bootWorthy, and will take up a fraction of the bootDisc. If you have any problems running the Try Before You Buy software, call 800-210-5517. If you make a purchase, your money goes to the software publishers, so please contact them if you have any problems or questions.

Eudora Pro: Communicate around the globe with one of the most powerful Internet and Intranet e-mail programs. Exchange stylized letters, electronic news bulletins, software, attachments, hot links, even animated greetings card—rich, meaningful information that's personal and customized to your taste. Let Eudora Pro software sort and file your messages and manage all of your e-mail accounts for you. www.eudora.com

Internet Utilities 97: Whether you're new to the Internet or a professional Webmaster, you know how frustrating it is to lose bookmarks and deal with slow Internet connections. Now there's a way to protect your bookmarks and pinpoint your Internet connection problems instantly. Internet Utilities 97 is a power-packed collection of utilities designed to help you solve today's Internet problems. www.starfishsoftware.com.

MicroHelp Zip: Luckman's MicroHelp Zip enables Windows 95, Windows NT 3.51 and 4.0, and Windows 3.x users to zip and un-zip files in just one step. Unlike other file compression products that take the user through a series of dialogs to zip and un-zip files, Luckman's MicroHelp Zip combines a drag-and-drop interface with a built-in file manager. www.luckman.com

Monologue 97: The only retail product that will read aloud any text on the computer screen. The new version offers enhancements such as an easily accessed "speak" command from popular spreadsheets and word processors such as Microsoft Word, Microsoft Excel, WordPerfect and Lotus WordPro; more than a dozen male and female voices; improved speech quality; and improved intelligibility for context-sensitive proofreading. www.firstbyte.davd.com

Sidekick 97: With full-featured calendars, flexible contact files, and powerful communications capabilities, you'll be able to manage all your activities with ease. Stay on top of your schedule with the calendar that organizes and prioritizes all your calls, meetings, and to do items. The flexible contact files help you keep track of vital information with virtually unlimited storage and foolproof search features. www.starfishsoftware.com

Spin Panorama: An innovative and easy-to-use software program that transforms multiple still images of a scene into super-wide panoramic still pictures and 360° QuickTime VR panoramic movies. Ideal for camera owners, website developers and small businesses, Spin provides the means for users of all skill levels to create and share high impact digital panoramic scenes. www.pictureworks.com

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Microsoft
Where do you want to go today?
KIDS TO ADULTS
KA
CONTENT RATED BY ESRB
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Cessna
A Textron Company
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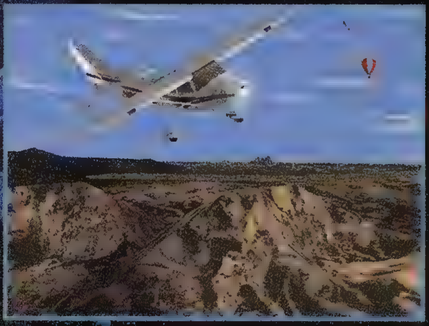
Look here ace, you've got just 90 feet of runway before you earn your wings the hard way. Face it. Your fixed-wing rules do not apply here. What you need is a helicopter.



And now you've got one in Microsoft Flight Simulator 98, an upgrade guaranteed to blow all past flying experiences out of the sky. With it you'll soar over vastly improved landscapes that include 3000 airports (10 times more than the previous version) and more than 45 cities around the world.

Microsoft
Microsoft
Flight Simulator 98

Flight Simulator 98 features multiplayer, force feedback support and flight models validated by Cessna and Learjet, so you can achieve all new levels of flight realism. Take control of the widest range of aircraft, including this Bell 206B JetRanger III helicopter, a machine that's guaranteed to make you feel like a rookie all over again.

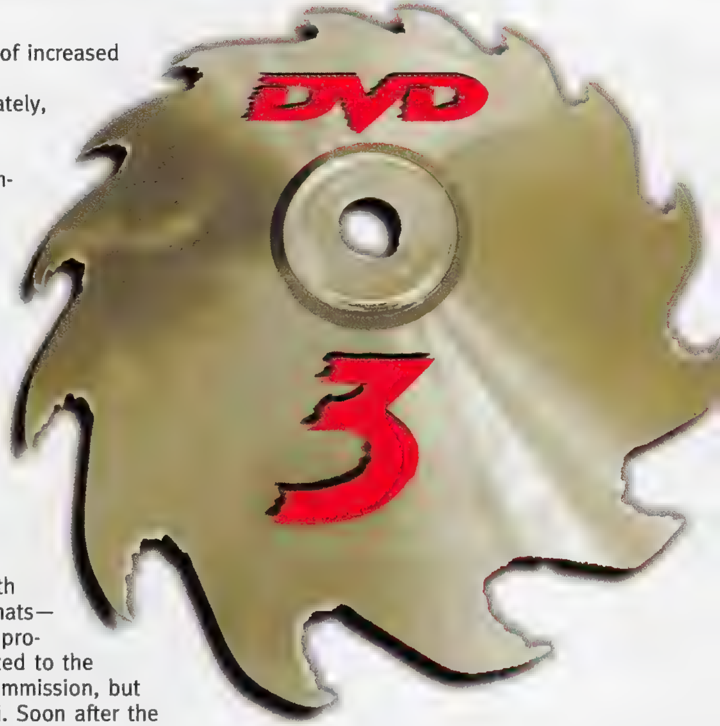
Aerospace
BF Goodrich

Your coordinates for take-off are www.microsoft.com/games/fsim

respective owners.

DVD-RAM Forum Strikes Out

Companies Defect; Create Opposing Standards



The DVD Forum—a consortium of consumer electronics and hardware manufacturers including heavyweights such as Hitachi, Sony, and Toshiba—recently announced a formal DVD-RAM spec that recognizes 2.6GB of data recorded in both land and groove tracks. For most, the news was welcome relief: Companies could begin building hardware so consumers could finally take advantage of increased storage capacity and performance. Unfortunately, the elation was short-lived.

Although all 10 members of the DVD-RAM Forum participated in defining the new spec, three of its core members—Hewlett-Packard, Philips Electronics, and Sony—quickly announced they were abandoning the standard in favor of a slightly modified 3.0GB format. This beefier format—which Sony claims provides better compatibility with other DVD and CD formats—is actually based on a proposal that was submitted to the European standards commission, but was ultimately rejected. Soon after the rejection, Sony was joined by Ricoh, Yamaha, and Mitsubishi, which all pledged allegiance to the 3.0GB format, leaving only a handful of companies still committed to the original standard defined by the DVD Forum.

"The 3.0GB format was designed to extend existing CD and DVD standards," said Sony's Mack Aracki, Manager of Corporate Communications. "More importantly, it's optimized for forward and backward compatibility."

So does that mean the original DVD-RAM spec isn't compatible? According to Hitachi's Peter Doelling, it is. "DVD-RAM will be backwards compatible with DVD-ROM, CD-ROM, CD-R, CDR-W, and audio," said Doelling. "Gaining compatibility with everything that's ever been produced mainstream is of the utmost importance."

At the heart of the dispute is DVD-ROM's compatibility with these new DVD-RAM formats. Sony's 3.0GB format, now called Phase-Change ReWritable, is essentially a 120mm disc format that is designed to be read by future DVD-ROM drives, which have now been dubbed DVD+RW drives. According to Hewlett Packard's Dave Deane, the DVD+RW spec has been designed so that existing ROM formats can achieve random read and write access with only minor hardware modifications. Deane says the DVD+RW spec also incorporates provisions for CAV which "is the obvious choice for computer applications."

"DVD-RAM is a natural extension of PD technology, which is practically non-existent in the United States," said Deane. "DVD+RW, on the other hand, is a natural extension to CD-RW, and it's clear those other companies are merely attempting to further their own agendas and technologies."

> "What's **odd** about [**Sony's** standard] **is** that it **doesn't** add any **significant** new **capabilities**, except **for** the **incremental** increase in **storage** capacity... They've **set** up this new **standard** to delay the **initial** product introduction and market **penetration** by their **competitors**."
>
> *—Hitachi's Peter Doelling*

NUGGETS

NEC to Abandon "Ultimate" Gaming Systems

exclusive A reliable source within NEC has confirmed the company is dropping its PowerPlayer line of PCs—which pioneered the recent trend in "ultimate" gaming systems—due primarily to lagging sales.

According to the source, NEC is selling fewer than 5,000 PowerPlayers per month, far fewer than the some 40,000 to 50,000 NEC Ready systems being sold during the same time.

NEC PowerPlayer
R.I.P.
1996-1997

Although she wouldn't confirm or deny the decision, NEC's Public Relations Manager D.J. Anderson did tell *boot* that "things were in a state of flux" at the company, and "although no formal decision was ready to be announced, NEC would continue to support current owners of PowerPlayer machines."

The cancellation of the PowerPlayer line means an end to 3Dfx-based NEC systems. Future NEC Ready-series gaming machines will come equipped with NEC's next-gen 3D/2D chipset, the AGP-compatible PMX-1.

Exponential's Patents Sold; Intel Is The Suspected Buyer

The much-sought-after chip patents owned by Exponential Technology have been sold off in a sealed-bid auction for some $5.1 million. The tidy sum, however, doesn't come close to meeting the failed company's estimated $10 million in debts.

> 17

Not so, says Hitachi's Doelling. Although he admits that second-generation DVD-ROM drives aren't compatible with either the 2.6GB or 3.0GB format, Doelling says third-generation DVD-ROM drives, slated for release mid-1998, will be forward compatible. Doelling also denied Hitachi has any hidden agendas.

"What's odd about [Sony's standard] is that it doesn't add any significant new capabilities, except for the incremental increase in storage capacity," said Doelling. "One could speculate, however, that since Sony and the other companies aren't leaders in the DVD market, they've set up this new standard to delay the initial product introduction and market penetration by their competitors."

"It's **clear** those other **companies** are merely **attempting** to further **their** own **agendas** and **technologies**."

—Hewlett Packard's Dave Deane

At press time, the new DVD+RW spec had been submitted once again to ECMA, the international Europe-based industry standards association, but had not yet been approved. The approval process is expected to take anywhere from six months to a year.

And if that weren't bad enough, the DVD Forum is also proposing an even newer format—expected to be finalized by the end of 1998—that mirrors the capacity of DVD-ROM. This new larger format uses the same wobbled land-groove tracks as the original DVD-RAM spec, using 635nm or 650nm lasers. The track pitch is going down to 0.6 microns (from 0.74 microns) with the bit length dropping down to 0.28 microns (from 0.43 microns), adding up to a 3.5Gb/square-inch density and a 4.7GB storage capacity. However, with the majority of companies already defecting from the DVD Forum's original standard, what companies actually participating in the formation or adoption of the higher capacity format remains to be seen.

Drives supporting the 4.7GB format aren't expected until 1999 at the earliest. But if the mutiny continues, there's no guarantee the DVD Forum will still be around to push it through.

Not to be outdone, NEC (which is currently not a member of the DVD Forum) has its own re-writeable proprietary standard waiting in the wings, with double the storage capacity of DVD-RAM. The Multimedia Video File Optical Disk Technology (or MMVF) has a storage capacity of 5.2GB, but can record and playback four hours of video data using both sides of a 120mm optical disc. Although specs were still being finalized at press time, NEC told *boot* the track pitch would be 0.6 microns, the bit length .33 microns, and the wavelength of the laser diode 680nm, similar in vein to the DVD Forum's 4.7GB spec as outlined above. Although no specific products or vendors have been announced, NEC plans to market MMVF in late 1998.

And in case you were hoping both the DVD-RAM and DVD+RW drives could somehow be compatible with each other, forget it. Hitachi's Doelling says "they're not compatible," while HP's Deane says "there's nothing in our specification that says you have to include support for the original 2.6GB standard."

Or, in other words, screw the consumer. With the media costing an estimated $25 to $30 a pop, and the drives costing anywhere from $400 to $800, consumers will ultimately find themselves in the middle of an expensive tug-of-war—*if* the technology ever hits retail shelves. ▮

NUGGETS

While nearly 20 companies—including Digital, AMD, Cyrix and S3—took part in the auction, most people believe Intel walked away with the 45 patents in a bid to protect its next-gen Merced processor, which shares many of the Exponential technologies.

Like Merced, the Exponential chip defined by the patents works with both Intel's CISC-based architecture and the PowerPC's RISC-based architecture. A system using such a chip would be able to run programs from either platform. Since Exponential filed for its patents before Intel, the auctioned patents would be protected under patent law. Since the technologies are so similar, insiders believe Intel would be forced to defend Merced if a competing CPU vendor—such as Cyrix or AMD—had won the bidding war, and attained the patents.

Matrox Turns To PowerVR For m3D

Matrox, oft-criticized for shipping poor 3D performers, has announced a new twist to its graphics card line up: a new 3D-only accelerator based upon NEC's PCX2 graphics chip. The PCX2 chip has already earned a Kick-Ass award in VideoLogic's Apocalypse 3Dx, and the m3D should prove to be nearly identical in all ways but one: The m3D will launch with a price of $99, slightly over half the price of the Apocalypse 3Dx.

The m3D features 4MB of SDRAM, and communicates with any modern 2D card (not just with other Matrox boards) over your system's PCI bus. This allows 3D in a window as well as full-screen 3D to be accelerated. 3D resolutions up to 1024x768 are supported.

The m3D will be packing an impressive bundle for such a low price. Confirmed to be included will be a full version of *Ultim@te Race*, one of the most gorgeous racing games ever. Also slated for the bundle will be a demo disc with limited versions of *MDK*, *Tomb Raider*, *WipeOut XL*, and *MotoRacer GP*. Rounding out the bundle will be two more yet to be confirmed full titles, one of which may prove to be *Hexen II*.

IBM To Use AMD's K6 In Low-End Aptivas

After months of price cuts and postulating, AMD has landed its first top-tier manufacturer—IBM—for its vaunted "Pentium Killer" K6. IBM plans to use the chip in select Aptiva models later this year.

> 18

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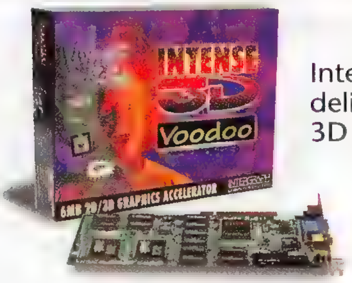

Intense 3D Voodoo delivers arcade-quality 3D graphics on *your* PC.

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Java Brewing

HotSpot and JavaPC Loom

"Java is just another programming language"—Microsoft

"Java is a platform, just like Windows, only better"—Sun

Microsoft
JAVA

Java may be just another programming language to some, but to others it represents the first step towards a new-world order. Defined as a virtual machine that can be implemented to run on top of any hardware and host operating system, Java can even replace a traditional operating system. Programs written in Java are compiled into instructions for these "virtual machines," which then compile the programs at runtime. This means the same Java program can run on everything from a PDA to a mainframe, and never needs to be rewritten.

Or at least that's Sun Microsystem's Java vision. Microsoft, on the other hand, prefers Java to be coupled with Win32, rather than Java-native APIs, forcing you to use a Windows-based platform.

As a result, Sun is racing against Microsoft to prove that: (1) 100% Pure Java can be as fast as native code; (2) there is a potentially large user base; and (3) major applications can successfully be written entirely in Java.

Here is the latest news on all three fronts:

HOTSPOT

First-generation Java virtual machines were just basic interpreters. Second-generation machines added the ability to compile Java programs into native machine code at runtime (also called "Just-In-Time" compilers). And now Sun has announced a third-generation virtual machine technology called HotSpot.

HotSpot, slated for release in early 1998, takes JIT compiling one step further: It analyzes programs as they run, and spot-optimizes the most critical sections.

"We expect to see performance levels at or around the level of a native-compiled C++ program," says Curtis Sasaki, Sun's Java Product Line Manager. "JIT compiling brings Java programs to within five to two times the speed of native code. HotSpot should bring it close to the native level, and so from a software perspective, performance is not going to be an issue."

JAVAPC

Originally announced as the "Windows Downgrade Kit" (see *boot* 10), JavaPC provides a way to turn your old 386 DOS-equipped PC into a fast and full-featured Java virtual machine, effectively giving older machines new life as network computers. Or as Sasaki put it: "JavaPC protects your original hardware investment." The kit, which costs $99, will be available for downloading from the Internet, and will consist of a Java virtual machine and a set of Java office applications.

NETSCAPE NAVIGATOR

Although Corel has pushed back its timeline for releasing productivity apps under Java, Netscape is already committed to releasing a 100% Java version of *Navigator* early next year. IBM is also gearing up its major Java development effort. Sun is hoping this massive coding effort from large players and smaller startups will pay off with viable Java applications within the year.

"We **expect** to see **performance** levels at or **around** the **level** of a **native** compiled **C++** program."

–Java Product Line Manager Curtis Sasaki

But should you care about this Java hubbub? Imagine buying a new machine and not worrying about whether Intel is inside, but only how fast and inexpensive the CPU is. Imagine being able to choose a non-Microsoft operating system, and yet still have all your favorite applications. Imagine the amount of pent-up hardware and software innovation that will be unleashed once designers are no longer chained to the Wintel platform.

Sun faces a tough fight. If it fails to deliver the speed or the apps soon, it won't be given a second chance. ▯

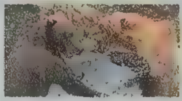
NUGGETS

> ***from 18***

At press time, IBM had not released technical specifications of the new PCs; however, boot has learned the K6 will be limited to low-cost or "value edition" PCs only. IBM's high-end line of Aptivas will continue to use a bona fide Intel processor inside.

McAfee Admits To Using Symantec Code in Virus Utility

After repeated denials, McAfee has now admitted that 100 lines of code in its *VirusScan* software originated in Symatec's virus utility. In a heavily spun press release, the company attempted to downplay the discovery, saying the software doesn't actually "use" the lines of code.



"It would be clear to any 'expert' examining this code that it performs no function whatsoever in *VirusScan*," says the release.

Symantec's Vice President and Chief Technical Officer Enrique Salem says, "It is remarkable that McAfee would attempt to downplay their culpability by claiming that even though the Symantec code is present in VirusScan, it is not used."

While MacAfee is petitioning the court to dismiss Symatec's case, Salem says, "We look forward to the jury trial."

StrongARM Flexes Portable Power

Digital Equipment recently demonstrated a 1.5V version of its StrongARM processor, setting a new standard in MIPS/w.

The 200MHz SA-1100 scored 230 Dhrystone MIPS while consuming only 250mW of power, the same amount of power used by NEC's mobile 4102 chip, which runs at 66MHz and can only perform 80 Mips. This incredible amount of portable power should allow the StrongARM to deliver computationally intensive features such as voice recognition to future PDA's and other consumer devices.

The next version of Windows CE (code-named Birch) will offer StrongARM support, and is due in early 1998. DEC claims they'll be ready to deliver the SA-1100 in volume well before then, and expects to commence shipping the chip this fall. The chip is only $39 for the 200MHz version, and $29 for the 133MHz model.

DEC is already hard at work on a next-generation 0.25 micron version of the StrongARM that should offer even better performance while consuming less power. It will be ready by late 1998 or early 1999. ▯

IBM Presents The ScrollPoint Mouse - Netscape
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The ScrollPoint Mouse works with a multitude of Windows® 95 applications, and even speeds you through spreadsheets and other really long documents. To get yours, visit your nearest retailer. Or drop by www.us.pc.ibm.com/ibmhome for more information.

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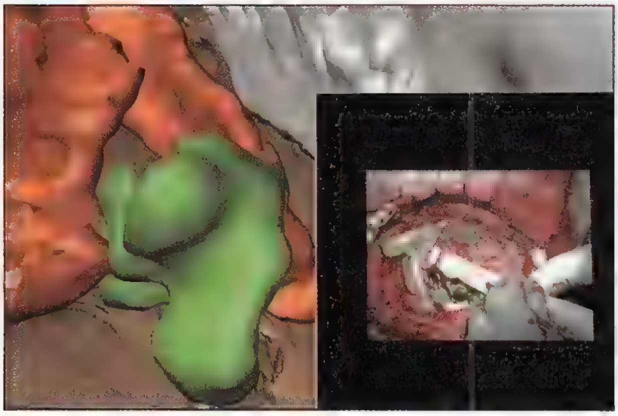
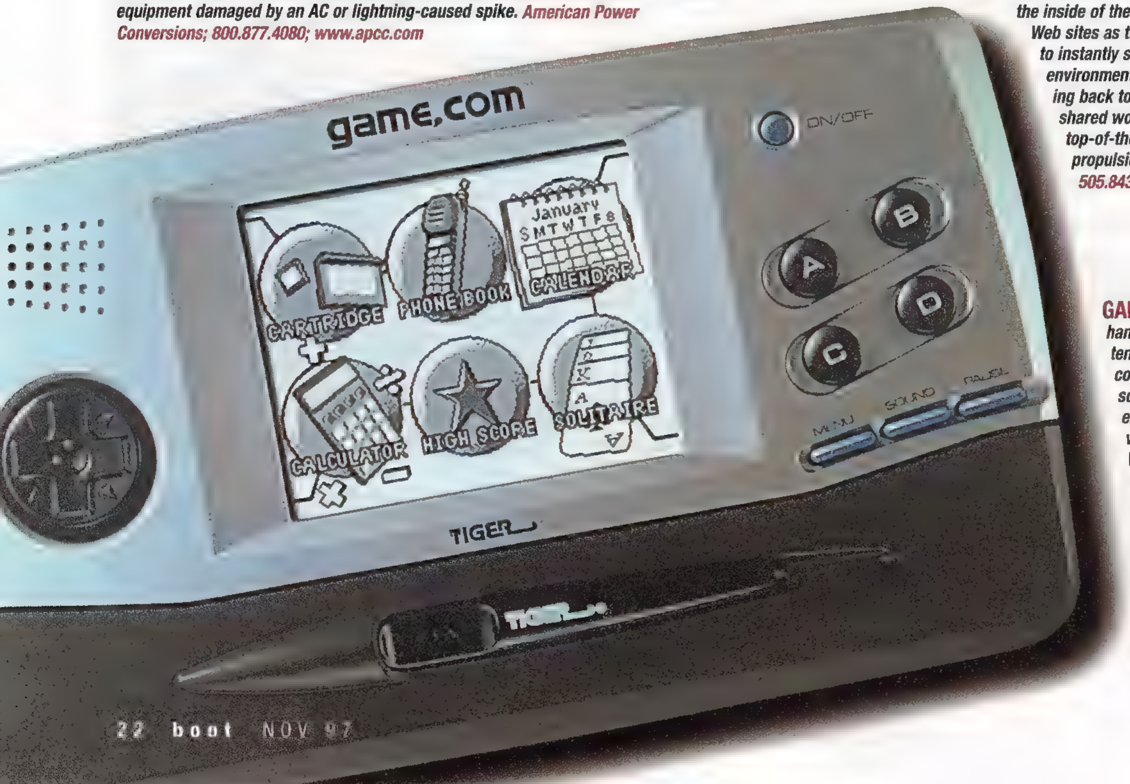
CREDITCARD Xircom's CreditCard Ethernet 10/100 + Modem 56 offers blazing connectivity in a PC card. The Fast Ethernet technology enables operation on both 10Mbps and 100Mbps networks with auto-sensing for seamless operation. The $379 CreditCard won't become a relic before its time, either—Xircom is providing a free flash upgrade to the 56K ITU Standard once the 56K protocol is set. Xircom upgrades and accessories include a MiniDock combining both the LAN and modem connectors in a single LED-outfitted box and the Cellular Connection Kit is easily jacked-in to many Motorola cellular telephones. Xircom, Inc.; 800.438.4526; www.xircom.com

SurgeArrest
Professional

SURGESTATION American Power Conversions latest surge protector, the SurgeArrest SurgeStation, is a lifeguard for PCs and other high-tech gear. The unit features eight outlets, including three that are spaced for transformers—finally, a power strip for accessory freaks. A "Building Wiring Fault" indicator lets you know immediately if there's a problem in the wall, and a foot switch is placed conveniently on the front of the unit for easy no-bend control. Models are also available with protection for telephone lines, cable modems, and networks (100BaseT, 10BaseT and Token Ring). The $59.99 SurgeArrest SurgeStations all come with a lifetime warranty and APC's Lifetime Equipment Protection Policy, which will repair or replace equipment damaged by an AC or lightning-caused spike. American Power Conversions; 800.877.4080; www.apcc.com

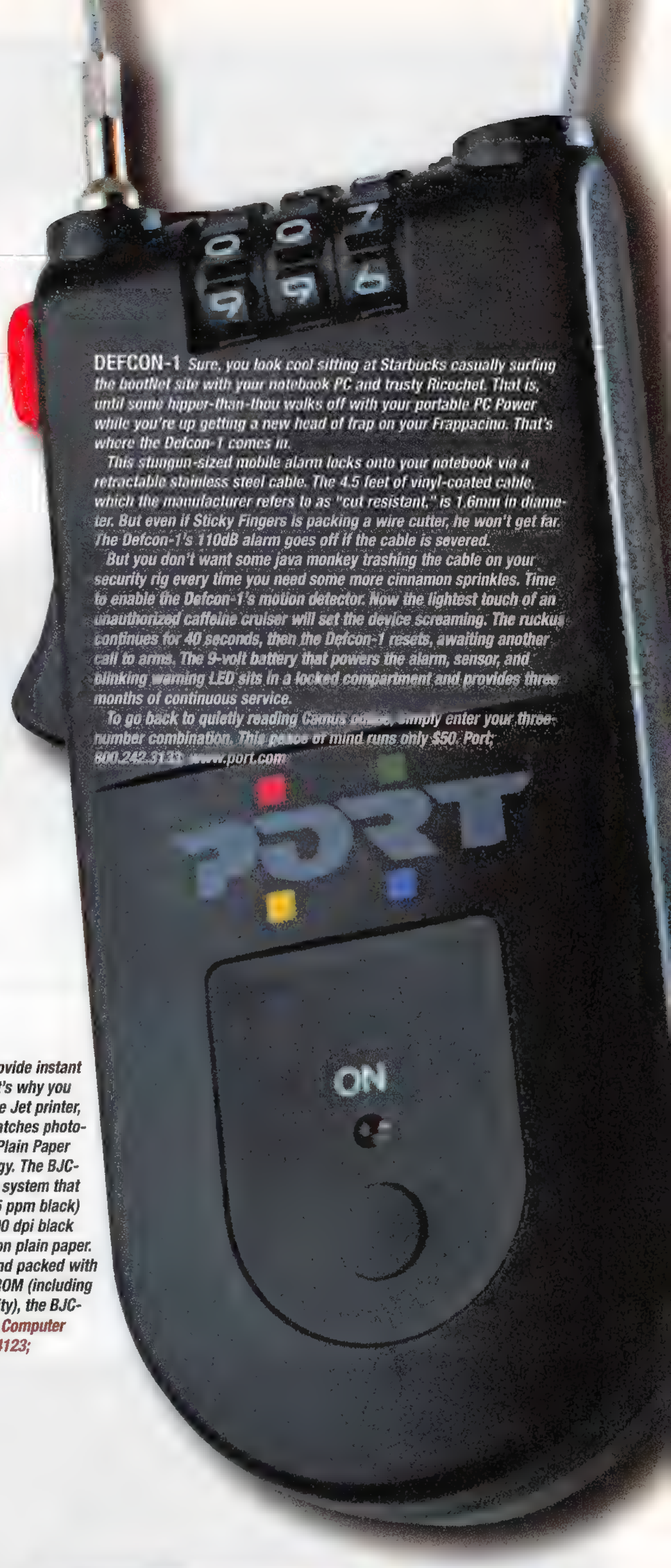


CONTINUUM Virtual reality has come a long way since Dactyl Nightmare. Continuum, from MuSE Technologies, enables collaboration in real-time over a virtual reality network. Basically, we're talking VR Groupware. Users of Continuum and the original MuSE (multi-dimensional user-oriented synthetic environment) system travel through the virtual reality in their own "craft." In addition to seeing the 3D world in which they're immersed, users can open private 2D windows on the inside of their crafts to view CAD designs or even Web sites as they work. Continuum also permits users to instantly synchronize and desynchronize the VR environments in order to work alone before teleporting back to meet up with the other crafts in the shared world. The first customer of a $130,000 top-of-the-line Continuum system? NASA's Jet propulsion Lab. MuSE Technologies, Inc.; 505.843.6873; www.musetech.com



GAME.COM Tiger's game.com is a $69.95 hand-held cartridge-based video game system, electronic organizer, and Internet telecom tool. Believe it. Using a touch screen/stylus interface, game.com enables users to play black-and-white versions of vidgames ranging from Duke Nukem to Mortal Kombat Trilogy to Madden Football '98. The 8-bit system's built-in organizer handles telephone numbers and provides a calendar and calculator. Make sure you drop an extra $20 for the optional modem cable package that includes software for email access and text-only Web surfing. Tiger Electronics Inc.; 847.913.8100

THE TRAFFIC *Remember those far-out sneaker-skates with the pop out wheels from the 1970s? The Traffic, from ski leader Rossignol, is the 1990s version. The Traffic combines a spacy-looking shoe with a detachable inline skate frame. No more lugging your sneakers, or walking around in socks after a skate to the office. Simply release the safety lock and latch to pop off the inline skate frame and brake in seconds. Available in numerous color combinations and styles, the $249 Traffic may be the future of self-propelled transportation.* *Rossignol Ski Company; 888.262.9868; www.rossignol.com*



DEFCON-1 *Sure, you look cool sitting at Starbucks casually surfing the bootNet site with your notebook PC and trusty Ricochet. That is, until some hipper-than-thou walks off with your portable PC Power while you're up getting a new head of frap on your Frappacino. That's where the Defcon-1 comes in.*

This stungun-sized mobile alarm locks onto your notebook via a retractable stainless steel cable. The 4.5 feet of vinyl-coated cable, which the manufacturer refers to as "cut resistant," is 1.6mm in diameter. But even if Sticky Fingers is packing a wire cutter, he won't get far. The Defcon-1's 110dB alarm goes off if the cable is severed.

But you don't want some java monkey trashing the cable on your security rig every time you need some more cinnamon sprinkles. Time to enable the Defcon-1's motion detector. Now the lightest touch of an unauthorized caffeine cruiser will set the device screaming. The ruckus continues for 40 seconds, then the Defcon-1 resets, awaiting another call to arms. The 9-volt battery that powers the alarm, sensor, and blinking warning LED sits in a locked compartment and provides three months of continuous service.

To go back to quietly reading Camus [illegible], simply enter your three-number combination. This peace of mind runs only $50. Port; 800.242.3133; www.port.com

RAYLINK *Like to rover around the office while you work? Raytheon Wireless Solutions's Ralyink Access Point and Raylink PC Card enables you to stray up to 500 feet (1,000 feet line of sight), and still access your LAN at 2Mbps. Raylink is the first wireless LAN solution to use the robust and secure frequency hopping spread spectrum technology. The Raylink Access Point, $1495, can be installed easily on a wall or desktop, and jacks right into an Ethernet 10BaseT backbone. The $550 Raylink PC Card is a PCMCI Type II-E flat antenna, so you can enjoy plug-and-play access without being chained to your desk.* *Raytheon Wireless Solutions; 508.470.9095; www.raytheon.com*

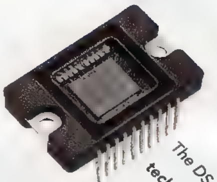
BJC-7000 COLOR BUBBLE JET *Digital cameras provide instant gratification, but JPEGs can't be kept in your wallet. That's why you need Canon's BJC-7000 Color Bubble Jet printer, which the company promises "matches photographic printing" through the Plain Paper Optimized Printing technology. The BJC-7000 features a seven-color system that prints up to 3.5 ppm color (5 ppm black) with a resolution of 1200x600 dpi black and color (with smoothing) on plain paper. Compatible with Windows and packed with the Canon Creative 3 CD-ROM (including an Internet printing utility), the BJC-7000 runs $449.* *Canon Computer Systems Inc.; 800.848.4123; www.ccsi.canon.com*

SURVIVAL RESEARCH LABORATORIES *Formed in 1979 by Mark Pauline, Survival Research Laboratories is a collective of artists, engineers, and computer scientists dedicated to the use of high-technology and industrial and military waste for "less practical" purposes. Confused? Imagine robotic spectacles of destruction and mayhem with machines as the sole actors—flame throwers, insect-like walking machines the size of cars, deadly air rocket launchers, high explosives, deafening soundtracks. But is it art? Because the full-scale Survival Research Laboratories shows are few and far between, the group is meticulous about documenting its devastation with high-quality videos: The latest SRL video release is from the March 1997 performance in Austin Texas, aptly titled* *Survival Research Laboratories; www.srl.org*

Create a world where superior technology and creativity collide.

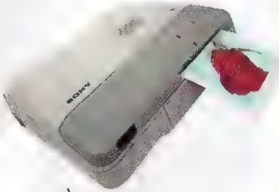
Because You Can.

When it's not busy helping you get the perfect shot every time, the DSC-F1's **RealView™ LCD screen** lets you instantly view or delete any shot you've taken.



The DSC-F1 uses Sony's unique **Progressive Scan, Square Pixel CCD technology**, translating into outstanding image quality time after time.

*The **Sony DSC-F1 Digital Still Camera** is small on size, but big on innovation. Storing up to 108 images at 640 x 480 resolution, it also features a 180° rotating head, built-in flash, as well as a rechargeable Lithium Ion battery. And that's just the beginning.*



Using the DSC-F1's infrared technology, instantly print out your favorite shots without wires by beaming them directly into Sony's **DPP-M55 Photo Printer** (no PC required). Or, wirelessly transfer them straight into your PC* or notebook.

Looking for an opinion that's a little more impartial than ours? Then check out all the **awards (14 and counting)** the DSC-F1 has racked up from experts throughout the industry.

For more information: 1-800-352-7669 or www.sony.com/image

How different would your work be if you only had the tools to match your own talent? Find out with the Sony DSC-F1 Digital Still Camera. The DSC-F1 fits in your pocket, so it goes anywhere you do. Yet it's packed with features like wireless capabilities, RealView color LCD screen and macro mode for close-up shots. No wonder the DSC-F1 has won awards and praise from experts near and far. Just aim, shoot and store up to 108 pictures, then manipulate them on your PC using included PhotoStudio® image editing software. Next, crank out a few hard copies with Sony's color photo printer, or add the images to a website or presentation. Of course, you can also let the boss behold your creativity on the big screen TV using the DSC-F1's video output.

With so many options, your workplace will never be the same. More importantly, neither will your work.

SONY

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Why **Java** Is **Doomed** To **Fail**

THE **GOLDEN** TECHNOLOGY WON'T **STOP** THE SETTING **SUN**

Perhaps I'm just-ill informed. Everybody seems to disagree with me. Some of the most successful people in the computer industry herald this new technology, and yet it seems obvious that it will all come crashing down the same way these movements always have.

I was at the leading edge of every new technology wave that came rolling in—only to crash on the beach and quietly slide away. Back then, it was Novell Appware, LotusNotes, Apple OpenDoc, Borland OWL, blah, blah, blah. This year it's Java.

I guess trade journals have to print *something* when nothing's going on. Apparently, everybody who reads this stuff has a short memory. Remember OS/2, 3DO, and Sun's defunct Windows emulation layer?

As a former technology strategist, it seems obvious to me why a language such as Java, while an exciting innovation in programming, confers no long-term tactical advantage to Sun, nor represents any threat to Microsoft. Maybe I've become cynical, or maybe I just know all the people too well. In any event, I'm going to tell you how this will all play out, for the record.

Java is a language, and there is no money in languages (see Borland, Symantec, Watcom.) There's no "magic" in creating a better programming paradigm, unless you can use it more quickly and efficiently than the competitors you give it to. The advantages of the Java language are available to everyone, and Microsoft is in a better position to leverage a language then Sun will ever be. That's one reason why Microsoft moved so aggressively to license Java from Sun. Everybody else in the language business has died.

Being a cross-platform language is also meaningless. There are *no other* platforms. People may wish there were, but there aren't, and for a dozen really good reasons that Java does nothing to address. Java can't stop Apple from going under, and it won't give Unix vendors a clue about making usable computers and operating systems for broader audiences.

The net has nothing to do with Java. It's an arbitrary association Sun has drawn to sell workstations. The random association of a new and improved programming paradigm with the Internet—which we all know is "new and exciting"—generates media attention. Sun loves it when people confuse Java with their Sun Workstations, or something to do with the Internet.

The reality: Sun makes no significant money on Java. Its revenue stream is based on Unix server sales. Java only contributes to this by making news about Sun more interesting than the delivery of another enterprise management widget. This is how its stock prices go up 10x, while its actual growth rate is declining. Stock investors who don't understand technology can't differentiate a neat idea from a commercially viable strategy.

Using an interpreted language to convey device-independent content over a network sounds great, but has tremendous performance disadvantages for the largest and most critical software categories: interactivity, multimedia, and games. Compiled content will always win that race. Virtual machines have never run real-time applications efficiently. Virtualization utterly destroys multimedia performance. Java is really only useful for the low-grade multimedia content spit out by Macromedia *Director*. Count the number of new *Director* titles are selling on store shelves, and imagine how much less successful this mess will be running even slower over the net.

> The **prospect** of running fatter, slower, **less functional** applications over the network **isn't** a strong case for **changing** paradigms.

Also, if a strategic alliance needs to last more than a year, the product almost always fails. The principal people and the competitive climate change so rapidly, these things rarely survive in any meaningful way. One day Apple is partnering with IBM and Netscape, and is Microsoft's arch enemy; the next day they're Uncle Bill's marionettes, and making Internet Explorer the default browser. If a plan requires large companies to work together for a long term, it's doomed.

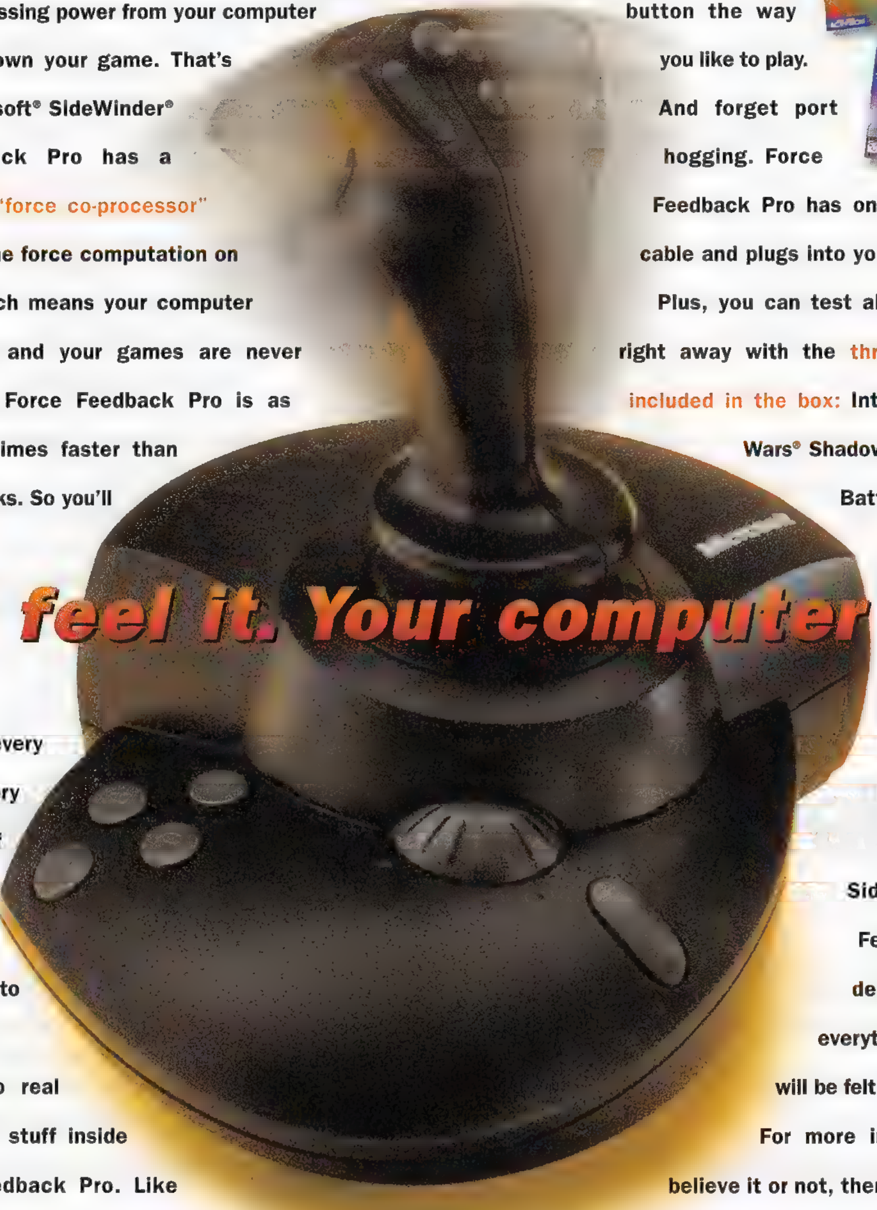
Failure is inevitable when people confuse a technology with a solution. Java is just a language. It won't help a company with no track record of designing computers to be used by human beings, or make consumer software, or develop a new market in other parts of the enterprise where computers are used by somebody other than engineers and MIS people. These are markets Java must penetrate to succeed, and these are the markets in which Sun has no useful experience.

Given that the Java language is irrelevant, all that's left is Java runtime. Slapping the "Java" name on another Windows OS competitor is good evangelism, but doesn't imbue the weak strategy with any *real* advantage, aside from grabbing some media attention. The prospect of running fatter, slower, less functional applications over the network isn't a strong case for changing paradigms. It just means enormous transition and adoption costs for a dubious, unproven solution. Sun will be gone before it achieves real momentum.

Microsoft will borg Java very quickly, adopting the useful parts and replacing the threatening stuff with nice Windows OS calls. In two years, nobody will remember that Java was Sun's idea. The other platforms will continue to decline, the NC will fail, and Java will become a footnote in computing history. Java's greatest contribution to Sun will be elevating its stock value enough to keep the best employees long enough to have a truly good idea. b

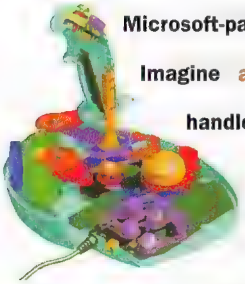
ALEX ST. JOHN From his position as Microsoft's game technology evangelist, Alex St. John was responsible for the controversial DirectX APIs that have either taken PC gaming to the next level or were horribly broken, depending on your point of view.

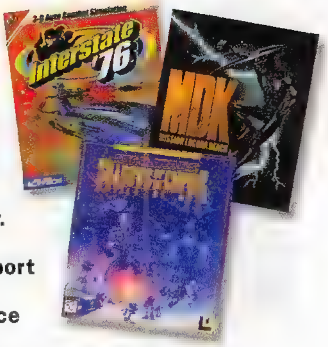
You'll feel it. Your computer won't.



Force feedback adds the sense of touch to supported games so you can actually feel the game. But a force feedback joystick isn't worth a dusty Pong if the stick is pulling processing power from your computer and slowing down your game. That's why the Microsoft® SideWinder® Force Feedback Pro has a 25MHz 16-bit "force co-processor" that does all the force computation on the stick. Which means your computer feels nothing, and your games are never slowed down. Force Feedback Pro is as much as six times faster than other force sticks. So you'll see and feel every Uzi recoil, every stall on take-off from O'Hare, and every nine-iron you shank to the left.

There's also real rocket-science stuff inside the Force Feedback Pro. Like Microsoft-patented digital-optical technology. Imagine a tiny infrared camera that detects handle and throttle motion to within one-hundredth of a degree without any wear or calibration.





The stick is also easily customizable, so in just a few seconds you can program each button the way you like to play. And forget port hogging. Force Feedback Pro has only one computer cable and plugs into your gameport. Plus, you can test all these features right away with the three killer games included in the box: Interstate '76,™ Star Wars® Shadows of the Empire:™ Battle of Hoth,™ and MDK: Mission Laguna Beach.™ The Microsoft SideWinder Force Feedback Pro. It's designed so that everything in your game will be felt. But only by you. For more information (yes, believe it or not, there is more), go to www.microsoft.com/sidewinder

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GAME THEORY

WITH T. LIAM McDONALD

Board with **Gaming**

THE **TECHNOLOGY** BEHIND THE HOTTEST GAMES ISN'T 3D—IT'S **CARDBOARD**

Once a year I bury myself in board games—remember them?—for *Games* magazine's annual buyer's guide. I'm happy to take a break from the monitor to be part of a small group of dedicated game geeks and industry vets who analyze all the games for the past year, and then make a list of 100 notable board games and 100 computer and video games.

This year I was struck by how much enjoyment I get from well-crafted and well-designed board games. There's a tactile pleasure in them, as well as a connection with living, breathing people that computers will never capture.

I'm also reminded that millions more people play and enjoy games such as Risk or Monopoly than will ever know or care who Lara Croft is. When the hot computer games of today are relegated to the discount bin of obscurity, there will continue to be more than 100 million Scrabble boards out there. If that doesn't humble those hotshot computer game designers and programming wonks, then it should. The Sierras and EAs of the world can labor from now until oblivion, and they will never reach that many gamers. They are merely throwing up nets to catch the wind.

The sad irony is that as the *Games* computer games list grows exponentially every year, the board game list shrinks. The reason remains a mystery. Computer games cost a bundle to develop, are often hard to use (or even to get working), demand tons of expensive equipment, have a low profit margin, appeal to a narrow audience, and are obsolete within months of publication.

> These **ports** from cardboard may not be as **sexy** as the latest 3D-accelerated *Doom* clone, but it'll **play** in Peoria, and that's where the fight for the **heart** of PC gaming will be won or **lost**.

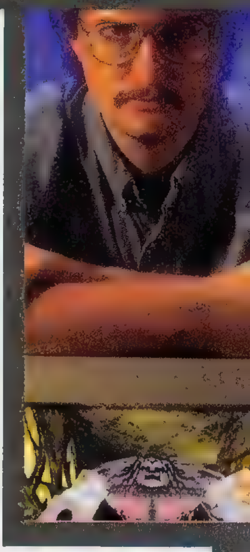
On the flip side, anyone who has ten bucks, a table, and a double-digit IQ can (and does) play Battleship, and he'll still be playing it in twenty years. The only answer is that the gee-whiz factor of computer gaming still hasn't worn off.

Beyond the constricting realm of the hardcore computer gamer, there's an entire world full of new computer users who take one look at a flight sim manual and run screaming into the night. These same people won't hesitate to pick up a game they already know, and Hasbro Interactive is tapping that user base. Hasbro owns both Parker Brothers and Milton Bradley, which means it accounts for more than 80% of the conventional gaming market. Their interactive division has entered the fray with a series of externally developed ports of classic board games, and they're about to embark on more.

Within the past two years, HI has published *Monopoly, Risk, Battleship, Clue, Othello, Yahtzee,* and *Scrabble.* A whole new group is also in the works, including *Star War Monopoly, Pictionary, Boggle, Sorry, Life, Stratego, Connect 4, Mastermind, Jenga, Outburst,* and a new version of *Trivial Pursuit.* These are games people know, and they are flying off the shelves. *Monopoly* is about to reach one-million units sold, and was still entrenched in the top five of the PC Data sales charts a year after publication. Not all have been good ports (*Clue* was particularly weak), but most have been strong enough to develop a following, and several (*Risk, Battleship, Scrabble* and *Monopoly*) are outstanding.

"When we develop a computer game from classic board game content, it's essential to stay true to the classic game-play patterns," says Tom Dusenberry, President of Hasbro Interactive. "Games such as Monopoly, Scrabble, Risk, and Battleship have entertained generations. We strive to capture that wonderful game experience, but expand it to take advantage of new technology."

Simply converting a board game to computer would seem simple, but in truth it can be more complex than creating a whole new game. People know these games by heart, and they develop certain expectations about how they can be played. "House rules" evolve that make the game special for each group, and the computer version needs to embrace these as well. Finally, there's the danger that in converting a flat board game to computer, you'll get something listless and boring that is neither a good computer game, nor a good board game.



T. LIAM MCDONALD is the all-knowing god of gaming. His mother still can't believe that he plays games for a living.

For the most part, Hasbro has skillfully dodged these ticklish issues and created games that go beyond the original. Both *Risk* and *Battleship* include new rules and new play types, as well offering the unadorned "classic" game experience. Most intriguing of all is the strong Internet support they're offering. You can play via direct TCP/IP connection, or meet players on the Internet Gaming Zone, Mplayer, and other sites.

Multiple language support and clean Internet connections take these old chestnuts into an entirely new realm.

People are snapping up these games because they're like old friends: They already know the rules and it's easy to begin playing. They will continue to offer the perfect entry point for new PC users who want to experience computer gaming. In a way, these titles are like a bridge from the gaming past to its future. These ports from cardboard may not be as sexy as the latest 3D-accelerated *Doom* clone, but it'll play in Peoria, and that's where the fight for the heart of PC gaming will be won or lost. ▮

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Product Information Number 112

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ON THE LINE

WITH SHEL KIMEN

No **Wimpy** Web **Sites**

SHEL KIMEN **WANTS**—NAY, **DEMANDS**—COOLER **CONTENT**!

Ravenswood vineyard—my favorite winemaker—totes the slogan "No Wimpy Wines." So, in the spirit of a good Zinfindel, this month's call is for no wimpy web sites! Once upon a time, the web promised a new gold rush, only this time the telecommunications trail put the golden railway to shame. This promised land bubbled over with the three E's—enlightening information, engaging multimedia, and, of course, entertaining multiplayer zoom-doom, quake-shake games with after-hours cyber-pick-up bars for chyks and dudes. While the content is still thin and flakey (like all good things in California), make no mistake about web technology: It's phat—and all it needs are some clever new minds to put it to use.

These products should pull you and your web site up to the speed it deserves—it's about time we put MTV in its place, and showed 'em what "real world" people can really do.

Video: Start making MPEG videos now because ubiquitous streaming technologies are literally around the corner. Expect this years' Internet World (December 9-12, New York) to be pushing, streaming, and broadcasting real-time and localized video—from sporting events and concerts to TV-style 30-minute webisodes. How ya gonna make yours?

While the **content** is still **thin** and **flakey** (like all good things in California), make no **mistake** about web technology: It's **phat**—and all it **needs** are some **clever** new **minds** to put it to use.

Get serious with the DCR-VX1000 from Sony. The $4,199 price tag seems pretty damn reasonable, given what you get. This camera shoots up to four hours of digital video (even while recharging the second battery) with incredible image quality. You also get Super SteadyShot picture stabilization, 24x digital zoom, and photo mode with adaptive frame interpolation technology; sure to please even the most fussy pros.

For almost half the price ($2,500), Hitachi, the makers of all that oozes metallic cool, is sporting a new little minicam, the MP-EG1A MPEG Camera. Shoot 20 minutes of video and thousands of still JPEGs with this smooth hand-held camera that weighs under two pounds. The camera spits out reasonable quality MPEG-1 video. While not suitable for TV, it works great for getting video to the web.

If your budget is below the $1,000 video range, jump down without losing much image quality to the Ricoh RDC-2. This little number costs about $700, and can store 10 to 20 images (depending on resolution). Extra memory is available, but that'll push the price up to the thousand dollar range and, at that point, it probably isn't worth it.

If you spent all your cash upgrading your system, pick up the Connectix Color QuickCam 2 for under $200. The video and stills are just mediocre, but in terms of bang for your buck, this is a great deal. Just in case any AOL users actually read *boot*, Connectix' lil' orb does support AOL's proprietary (boo) ART file format, as well as the industry standards (yeah) GIF, JPEG, and TIFF. The *CU-SEE-ME* and video phone frame rate is much improved over the original QuickCam.

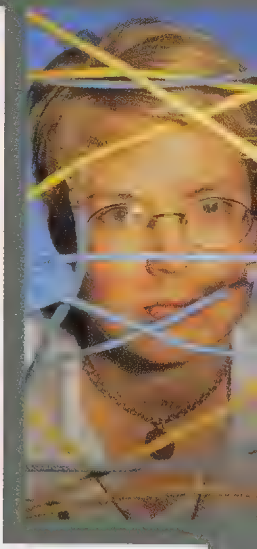
Dynamic HTML: mBed Software's Interactor provides next-gen HTML content creation to get that video you just shot into a cool web page. Primed for 4.0 browsers, Interactor has a head start. Unfortunately Netscape and Microsoft haven't standardized Dynamic HTML, so you'll have to build browser-specific content, or make dual web sites. The saving grace is that Interactor is simple—if not too simple—so making two sites shouldn't be that difficult. While it might be hard to swallow the $300 price tag, sometimes being the first kid on the block with the super-cool new toy really does make a difference.

QuickTime VR (it keeps going and going and...): *PhotoVista* is a $79 cool tool from LivePicture. Shoot a 360-degree series of photographs, and this bit set will churn out a super-smooth QuickTime panorama. Download your images, and you're off and running. There's just one glitch: You must download the photos in proper order, because there's no built-in mechanism for moving pictures around once they're in the working window. This is a bummer, but it hardly makes or breaks this otherwise outstanding product.

Imaging Tools Written in Java: *PointPlus*, from Net Scene (**www.net-scene.com**) converts PPT files to Java-style viewable on the web. The software also uses streaming technology for quicker downloads. A smaller program is *ImageFlipper*, a shareware utility from Cameron Gregory (**www.bloke.com/javascript/Flipper/**). This gem uses JavaScript for a bandwidth-friendly slideshow. Cool!

Ever wish you could take some photographs and build a full-textured 3D object? *Freedom VR* from Paul Houle (**www.msc.cornell.edu/~houle/vr/freedom/**)does this. It creates a VR object viewable from any angle. As a super bonus Houle gives away the source code! In the spirit of a true Internet advocate, Houle says, "I got sick of a great technology languishing because everyone was trying to make a quick buck, so I decided to put an end to this situation."

If anyone's going to up the content bar on the World Wide Web, it's going to be a devoted *boot* reader. Please let me know if any of these cool new tools or products work for you (and send me the URLs to prove it!). ▮



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Would you believe a Windows PC for under $500? It's not as crazy as it sounds. And these dirt-cheap PCs will be more powerful than you might think.

The next step in large-scale circuit integration is to combine all of the most important components of an industry-standard PC onto one or two superchips. In addition to dramatically slashing manufacturing costs, these "system on a chip" computers will also relieve some I/O bottlenecks that are choking today's PCs. As a result, they'll deliver surprisingly snappy performance—not top-end performance, to be sure, but much more than you'd expect.

I'm not talking about network computers or WebTV-type appliances. This time I'm describing real Windows PCs that look and run much like the machine you've got now. The main difference is they'll cost less.

Engineers have been anticipating the system on a chip for a long time. It's the next logical step in the 40-year march from transistors to integrated circuits to microprocessors. In recent years, microprocessors have been absorbing all kinds of additional functions: FPUs, power management, cache memory, cache control. Heck, the latest processors have more RAM in their L1 caches than my first computer had in main memory. And superscalar processors that execute multiple instructions per cycle are like multiple CPUs on a single chip.

Cyrix is already working on **MMX**-compatible **MediaGX** chips with **200MHz** and **faster** clocks. Sometime **next year**, the **$500 PC** should be a **reality**.

The company working the hardest on superchips is Cyrix, which already makes a superchip called the MediaGX. Together with its companion chip, the Cx5510, it integrates several functions of a Windows PC: an SVGA graphics controller, the graphics frame buffer, industry-standard audio, the memory controller, and a bridge from PCI to ISA and IDE. In other words, two chips do the jobs of a CPU, a graphics card, a sound card, and the "north bridge" half of a core-logic system chipset. The latest MediaGX runs at a very respectable 180MHz. It's so cheap that Compaq's MediaGX-powered Presario 2200 carries a suggested retail price of only $799 for a system with 16MB of RAM, a 1.6GB hard drive, 8x CD-ROM, and a 33.6Kbps modem.

But how fast is it, really? CPU-intensive benchmarks usually indicate the MediaGX isn't quite as fast as a Pentium at the same clock speed. In this case, however, benchmarks don't tell the whole story. Large-scale integration delivers benefits that CPU benchmarks sometimes don't measure. This point is crucial to understanding why future superchips will offer competitive performance at low prices.

Modern CPUs have all kinds of fancy features for executing instructions more quickly. But they're I/O-bound—they spend most of their time waiting for instructions and data to arrive from slower memory chips and devices. That's why caches keep getting bigger. The fast SRAMs in the caches temporarily store instructions and data to keep the execution pipelines from running dry.

The industry is working on solutions to I/O problems: larger caches; higher bus frequencies; faster DRAMs; more use of backside buses for the L2 cache; and 64-bit, 66MHz PCI. But those transitions will take years, and won't come cheap. What if you could get some of those benefits sooner, and for less money?

You can, with a system on a chip. By integrating the graphics controller and the frame buffer, for example, the CPU doesn't have to wait for graphics data to arrive over the 33MHz PCI bus or even a 66MHz system bus. Instead, all the action happens at the CPU's core frequency—180MHz or higher. It's so darn fast that superchips can get by without an L2 cache, cutting costs still further.

That's why application-level benchmarks indicate the MediaGX runs neck-and-neck with a Pentium at the same clock speed, at least with integer applications. Current MediaGX chips have slower FPUs and no MMX, but that's easy to fix. Cyrix is already working on MMX-compatible MediaGX chips with 200MHz and faster clocks. Sometime next year, the $500 PC should be a reality.

TOM HALFHILL is a senior editor at *Byte* magazine and the author of two computing books. He first became interested in computers during the disco era.

National Semiconductor's recent acquisition of Cyrix is a key factor. National makes a wide variety of chips that are vital to PCs, such as the Super I/O chips that integrate the serial, parallel, mouse, and keyboard ports. National has already announced plans to create new superchips based on Cyrix's proven CPU cores.

The only drawback of a system on a chip is that it's usually not as upgradable as a conventional PC. The Presario 2200, for instance, doesn't have PCI slots. But if prices drop below $500, it won't matter much to the people who buy these systems; everything they need is already integrated. Also, many cheap PCs will be purchased as second computers by people who already have higher-end systems. A household with two or three computers isn't that strange anymore. One thing the cheap PCs won't do is eliminate the future market for NCs and WebTV-type boxes. Just because a computer is easy to afford doesn't mean it's easy to use. The learning curves for Windows and application software will be just as steep. But if prices drop below $500, just about anyone who really wants a Windows PC will be able to buy one. PCs have been way too expensive for far too long, and it's about time they became as affordable as TVs and VCRs. b

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*3D's **toughest** gladiator isn't made of **polygons**, and doesn't need hardware **acceleration** to lob bombs at **enemies**. Meet **Scott Sellers**, VP of R&D for **3Dfx**. Last month, he described the **architecture** of good 3D **chipsets**. This month, he describes the architecture of **bad 3D** business. S3, ATI, Matrox, **Sega**, **PowerVR**—none are spared the **bluntest** of **barbs**. Scott Sellers is fully **armed**, fully **strapped**, upside down with **excitement**, and ready for a...*

Bo

***boot** Millions of people believe their S3-based card provides 3D. How much do you think this misperception weakens the 3D market?*

Sellers I don't think there even *is* a 3D market right now, outside of games. I don't think people outside games know what 3D is right now. Maybe they know it was used in *Terminator*, or they saw *Toy Story* and said, "This is 3D? That's pretty cool."

I don't see that there's really a consumer demand for 3D right now. It's growing—no doubt about that. But the gaming community—which is all we're focusing on for the time being—they know the difference. And the gaming community does understand the difference between an S3 and 3Dfx.

S3 will tell you 3D has already gone mainstream. The argument is, Do you believe ViRGE is a 3D accelerator or not? I don't believe it is. Games run slow on ViRGE and they run software-only. That is *not* a 3D accelerator.

Christmas '97 is going to be a huge retail year for 3D add-in boards. Christmas in '98 will be huge for the system OEMs shipping *real* 3D accelerators on their motherboards.

***boot** When 3Dfx hit the scene, 3D was still an emerging technology. Were you surprised by initial developer reaction?*

Sellers I wouldn't say we were surprised. We basically built what developers asked us to build. The opposite was true with everyone else out there, from Creative Labs to Rendition to Nvidia, all promising this stuff. And we were doing the same thing: It was all a promise. Any developer will tell you 3Dfx was the only one that actually delivered. I have a lot of satisfaction knowing we are a credible company, and that we aren't out there blowing smoke and making lies, which all of our competitors are doing.

We're not going to engage in all that other crap going on.

***boot** Matrox and ATI have all these diatribes about each other's performance claims. Do you guys look at that?*

Sellers I look at it because I'm an avid web surfer, and it's pretty comical.

***boot** Is that indicative of the industry right now?*

Sellers No doubt. Companies are grasping for ways to sell their products. But that's nothing new, right? It used to be VGA performance, and then it was SVGA, and then it was Winbench, and then it was games, and now it's 3D Winbench. It's all the same stuff, and Matrox and ATI have been at each other for as long as I can remember.

***boot** What made you think a 3D add-in card could succeed in a world of 2D/3D solutions?*

Sellers Our first goal was to get something to market soon. We felt that time-to-market with a compelling product was the key. Doing legacy designs wasn't going to be the best use of our time.

Because 3D was a new technology in the PC space, this wasn't going to be an OEM-driven model. Large system houses wait for technologies to mature before putting one in every system they sell. The early market for hardware 3D acceleration was driven by retail sales, and this is still true today.

We also knew the people we're targeting are early adopters. These people already have a Matrox Millennium, or an ATI ProTurbo, or whatever. They've already spent $400 on a 2D video accelerator. Why would I want to make them make them throw that away, and why would I want to compete with that? ATI and Matrox have been in the Windows acceleration market for years, and it would be naive for me to bet my entire technology that not only can I create awesome 3D acceleration that no one else has ever seen before, but also beat them at their own game. It's just too much to do in a first-generation product. People who read your magazine have a Matrox Millennium and they have a 3Dfx accelerator—that's the best of all worlds. I don't want to produce a 2D-acceleration chip we have to make excuses about. I don't want to make a chip where the VGA is incompatible.

***boot** Were any of the features in the original plan so opposed by developers that they ultimately didn't make it into the final spec?*

Sellers Developers are an aggressive crew, right? Developers universally said, "Oh yeah, if you have that, we'll use that." Mostly we had under-spec'd the part. They were saying, "I'd really like to do this, but let's expand on it." The classic example: Due to gate count reasons we didn't really understand RGB lighting where you take a fully RGB component and multiply that times the texture. We looked at games such as *Quake* and *Doom*; they weren't using colored lighting. So in the early days we thought, "Maybe diffused lighting is okay." That was in the original spec, and developers said, "You're crazy! That is way too limiting."

> "Any developer will tell you **3Dfx** was the only one that actually **delivered**. We aren't out there blowing **smoke** and making lies, which all of our **competitors** are doing."

ngRun

PART TWO

PHOTOGRAPHS BY
MARK MADEO

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From Tiny Acorns...

***boot* Oak was showing a chip at E3 that had better visual quality—thanks to its anti-aliasing and tri-linear filtering—but with a performance hit. Are you worried?**

Sellers I congratulate Oak on their visual quality—there's no doubt it's number-one right now. But I'm glad you're able to recognize the performance penalty because a lot of the press don't really get that. It's very significant. And they were running on P-IIs running at 266MHz.

The Oak part is an excuses part. Yes, it looks great and everything else, but if you have to make excuses about 3D performance, you will have to make excuses about 2D performance because it's a 64-bit standard EDO part.

If we do a 3D Winbench comparison against Oak, we're going to blow them out of the water. As much as I hate 3D Winbench, it does serve a purpose and consumers understand bar charts, right?

Certainly their software isn't optimized yet, but performance-wise they're not going to be competitive. I'm sure they're working on next-generation stuff that will address those issues. For the gaming market, it's not interesting because the performance isn't there. Frame rate is number-one. Without frame rate it doesn't matter how good it looks. It's like *Myst*. Looks beautiful, but not an interactive game.

***boot* Do developers or consumers ever have suggestions to how to improve your technology?**

Sellers Absolutely. In the early days, people felt they could improve the performance of our boards by doing a little engineering work on their own. So people were soldering things on and off the boards. Hey, they were able to get 20% better performance by increasing the clock rate!

Seriously, we spent a lot of time with developers when we originally developed the Voodoo Graphics. Basically, we started with a spec sheet and said, "Here, this is what we're thinking about building. Is this interesting? Would you use this? How do we improve it?" You can literally go down a list of features, and say this is as a result of one comment, and that was what we originally wanted to do.

We're really just an overblown contract house for developers telling us what they want. Voodoo 2 and Banshee are based on where we feel 3D should be moving, but it's still fundamentally driven by what the developers want, how we can improve their lives, how we can make it easier to program for.

***boot* How long have you been working on your 2D/3D card, Banshee?**

Sellers Almost two years. id Software is famous for saying, "It's done when it's done" or "It ships when it's ready" or something like that. And that's kind of the mentality we've had with Banshee. We've passed the point of "Can a user tell the difference between a 70 million Winmark and a 100 million Winmark machine?" But I'm not going to alienate people by having a terrible VGA performer. Same story with SVGA. I don't want my OEMs to make excuses for their decision to use 3Dfx.

***boot* What experience do you have with 2D?**

Sellers At SGI, we did a lot of 2D/3D accelerators. And at MediaVision we created a full Windows accelerator that won *PC Computing*'s Best Buy award; blew away ATI and Matrox performance-wise. It was a short-lived product because MediaVision went down the tubes. So that should not be a question mark about 3Dfx.

***boot* Are you concerned that some might view your going into the 2D/3D business as abandoning the technology that made you successful?**

Sellers 3D is still the number-one goal for any chip we create. And it's important that Banshee also runs all the games for Voodoo and Voodoo Rush. We're not going to alienate people and make excuses. Banshee improves performance dramatically; it runs every game out there; it adds new 3D features.

***boot* Voodoo has a split memory architecture, while Banshee will have unified. How dramatically does unified memory affect performance?**

Sellers If we did every single technique with split architecture that we do with unified memory architecture, split would always win. We've created technology such that UMA performance is so significantly close to split performance that it justifies moving to UMA because of all the advantages of using UMA.

On the 3D side, overall memory management is much easier. For example, currently you waste memory running in smaller resolutions because you have dedicated frame buffer memory separate from texture memory. UMA allows developers to play "I'm not using Z-Buffering so I can use that memory for texture" games. That's important.

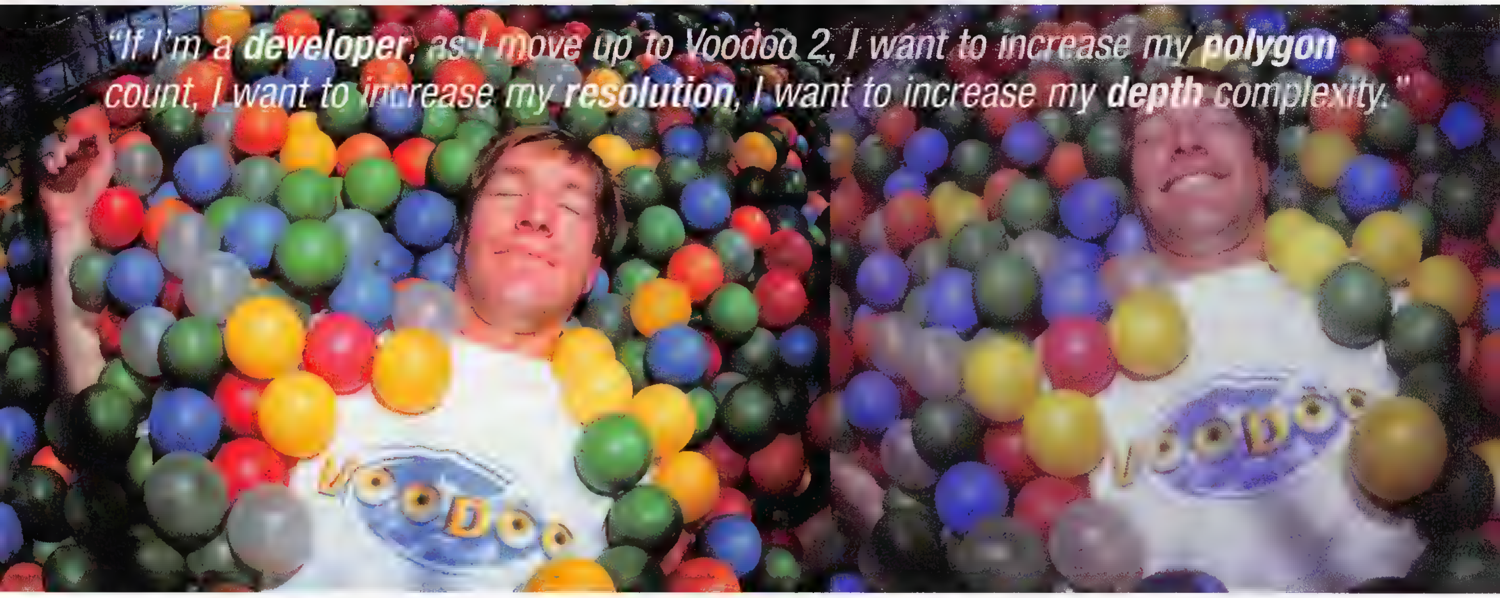
The second advantage is one developers have asked for: rendering directly in the texture memory. This is real useful for things such as rear-view mirrors in driving games.

You can play all sorts of other tricks with memory management, such as quad-buffering if you're doing stereo-out, or triple-buffering to get better frame rate consistency. Moving forward, UMA will also be cheaper because you're able to use more mainstream system memory chips.

***boot* What else can you tell us about Voodoo 2?**

Sellers As you can guess from its name,

"The people we're targeting are **early** adopters. They've already spent **$400** on a 2D video accelerator—why would I want to make them throw that **away**?"



"If I'm a **developer**, as I move up to Voodoo 2, I want to increase my **polygon** count, I want to increase my **resolution**, I want to increase my **depth** complexity."

it's the same concept as Voodoo Graphics—a 3D-only solution. We didn't feel 3D-only would live as long as it has, but our volumes on Voodoo continue to grow tremendously. The acceptance of 3D-only is unquestioned at this point.

***boot* Will any game absolutely require the power of Voodoo 2?**

Sellers No doubt. If I'm a developer, as I move up to Voodoo 2, I want to increase my polygon count, I want to increase my resolution, I want to increase my depth complexity. And now there's a lot of exciting technologies coming out that allow a developer to do just that, especially on the polygonal modeling side. And that's the perfect scenario. They're happy because they can still support low-end architectures. We don't understand why, but they want to.

***boot* Voodoo Rush was announced at Comdex, yet only two manufacturers are using it so far. Do you consider Voodoo Rush a failure?**

Sellers Absolutely not. Frankly it's taken longer to productize it than anyone would have liked, because there were technology hurdles we had not accounted for. We were disappointed on that front.

***boot* Did 3Dfx ask Intergraph to do a card because you felt nobody else was doing Voodoo Rush right?**

Sellers We've been courting Intergraph since Day One. These things take a long time to actually solidify. When EA jumped in, it made the decision a no-brainer. EA had some interesting requirements from their board manufacturer that Intergraph was able to solve. Every one of our OEMs has the ability to productize the Voodoo Rush, and many are, and many will be.

***boot* 2D cards have peaked, performance-wise. Is there an end to 3D card evolution?**

Sellers We are nowhere near the level of consumer expectations. The gamers buying our boards today are the same people who played games four years ago. They were the ones that were blown away by *Doom* and said "Wow, this is awesome!" They've seen the evolution of technology, and they understand how far we've taken it. But if you pull someone off the street and show them our stuff today, it just doesn't blow them away—it's not *Toy Story*. No one is close to doing *Toy Story* in real-time right now, and that's the level of visual quality the real consuming public expects. And until we're to that point, we are nowhere near satisfied.

***boot* Is the Toy Story ideal attainable?**

Sellers Absolutely.

***boot* What's the ideal fill-rate in 1998?**

Sellers Infinite. And this is not video fill-rate or S3 fill-rate. You've got to turn on Z-Buffering, you've got to turn on alpha blending, it's got to be bilinear filtered, it's got to be per-pixel bumpmapped, which, by the way, no one does yet. They're trying to catch up, but they don't do that. Turn on all those features, and *then* talk about your fill-rate. With that as a basis, Christmas '97 should see 75 megapixels per second. Christmas '98 should see 125 megapixels a second. Christmas '99 should see 250 megapixels.

***boot* What's the absolute minimum frame rate people should be get from their games?**

Sellers I've said if you're not at 30fps, it's not interesting. And I get some pushback from the PC game developers. But 60fps is where we're pushing people with Banshee and Voodoo 2, because if you've ever seen the difference between 30 and 60fps, it's remarkable.

The pushback has been that there are too many other unknowns in the PC to sustain 60Hz. And the goal, independent of frame rate, is consistency. So even if you're at only 15fps, stay at 15. Don't pop up to 25fps and down to 5fps. People get sick. It drives you nuts. Nobody wants to sit and watch that. So developers have been concerned that unknowns such as a network card suck away time. Can the PC absolutely sustain 60Hz? We'll find out in the new board.

***boot* What frame rate do you see as the limit?**

Sellers The European ergonomic folks say 75Hz is a *minimum* monitor refresh rate. And our goal is certainly to be at monitor refresh rates. The problem is that if you're

The Best and Worst 3Dfx Games

***boot* What games show 3Dfx in the worst light?**

Sellers Most are Direct3D games from companies that just shouldn't be in the game business. They look bad on all boards. They look bad on ours, they look bad on Rendition's, they look bad on S3's. No game runs bad on 3Dfx and runs better on another board. The games that are bad are just plain bad, and they're bad on every board out there.

***boot* What about best game last year?**

Sellers I really enjoy *Quake*. I enjoyed *Quake* and it was software-only. I liked *Virtua Fighter 3*. I thought that was beautifully done and a great game. I liked *San Francisco Rush* a lot because it was very different. It appealed to the puzzle-solving side.

That's probably about it. There just weren't that many titles available last year that were really earth-shattering.

not at the video refresh rate, you're at half that. Say I'm running my monitor at 85Hz, a game has to run at 42fps. That's probably not the right trade-off. I'd prefer 60 for the interactivity. That's more important than the eyestrain. I run my desktop at 120Hz because I stare at it all day. It's different, because you're usually not watching a game all day. Users will accept lower monitor refresh rates to get interactivity. And technology improvements will allow us to start creeping up.

***boot* How important is MPEG-2 Motion Compensation?**

Sellers It really depends on who you talk to. And it's really a race against time. For awhile, system OEMs were telling us MPEG-2 Motion Comp was very, very important. But as Intel creates faster and faster CPUs, the need for Motion Comp goes away. If you do AGP bus mastering, and support native YUV planar, and do color space conversions, and stretching on the backend, which is now pretty common... Well, maybe not. But anyway, if I use *that* as a basis with a 266MHz Pentium II, you can hit 20fps for full-resolution MPEG-2 video using 100% of the CPU. With Motion Comp, you get up to 24fps, which is the native frame rate for an MPEG-2 movie. Next quarter, that goes away because Intel's got a 300MHz CPU.

It's really just question of how long is MPEG-2 Motion Comp really interesting. We're only talking about 15% at most performance benefit.

The other thing is what content is driving it? Will people watch MPEG-2 movies on their PC? I wouldn't. Maybe in a living room PC, like the Gateway Destination 2000. But that's a tiny market. It doesn't matter in the larger scheme of things, so I'm not going to make technology decisions based on that market.

The one thing that I can *possibly* see—and it's a stretch—is that people would want to use MPEG-2 Motion Comp mixed with 3D rendering in a game. But MPEG-2 Motion Comp is nowhere near able to do that because it takes 100% of a Pentium II just to decode the video. I want to do that for free *and* I want my CPU to be able to do AI and physics and, wow, 3D graphics, and all that other stuff. And that means full decode in hardware. We're not there yet either, due to gate count reasons.

***boot* S3 says Intel forced AGP on the industry and that by the time it actually comes out, it'll be outdated. Do you agree with that?**

Sellers Absolutely not. Either intentionally or unintentionally, Intel has linked AGP with directly texturing out of main memory. But it doesn't have to be that way. Developers don't want to take that performance penalty. You need to be able to texture out of local memory. And some games want to texture out of local memory exclusively. AGP provides a way of transferring much more data down to the card. Not only lots and lots of polygons, but also very fast texture downloads. So AGP buys you a step in the right direction. In no way is it outdated.

***boot* Is AGP everything Intel makes it out to be?**

Sellers AGP solves a bottleneck. You just can't pass down a million triangles a second over PCI today without saturating the bus, so AGP broadens that pipe and we're able to get 3 million triangles a second or higher, and not worry about that. So it's fixed a problem we're nervous about: If my hardware does 10 million triangles a second, what's the point if I can't get it there? AGP has solved that problem.

***boot* When will 3Dfx do AGP?**

Sellers Banshee is an AGP part.

***boot* 3Dfx is a poster child for traditional 3D architecture and PowerVR is the leading proponent of non-traditional architecture. What are the advantages and disadvantages to each?**

Sellers The number-one advantage of traditional architecture is the developers' familiarity. There's no question they're not used to developing for PowerVR, and they don't like to. Look at the dollars PowerVR has had to spend. People don't support PowerVR because they like it. They do it because they've been paid to.

A good example is *WipeOut XL*. They paid for *WipeOut XL*, and all they got was a slightly optimized version.

It's not hardware companies' business to predict which games are going to be popular. We just want to make sure that everyone supports 3Dfx—and the consumers will choose which games are best.

How much have we spent on getting games ported to our architecture? The number is zero. People port to us because the engineers like it. The publishers like the way it looks, and they like the frame rate. The business folks like the fact that they are able to get something in a week and it looks great. PowerVR is very different. You just don't develop something overnight in PowerVR. It takes a long time. It's why

Cramming For The Big Test

***boot* What's the best way to compare 3D cards?**

Sellers Take your favorite game and ask, "Does my game run on the accelerator I'm thinking of buying? Are developers supporting this board?" That's no-brainer stuff.

If you're a *Quake* player, run *Quake* on a Rendition, then run it on 3Dfx—you won't buy a Rendition. Run it on PowerVR... Well, you can't. If you're a gamer, you know the majority of games are already on 3Dfx. Cost is not an issue anymore. It's that kind of no-brainer stuff that really makes sense.

***boot* What about benchmarking?**

Sellers The best benchmarks are games themselves, because regardless of how good or bad a 3D benchmark is, it doesn't matter if the game you like doesn't run.

Benchmarks do serve a purpose. The mass-consuming market needs a simple metric to compare boards against. They can't go out and run their favorite game on a variety of different boards because they don't have the necessary equipment.

I don't like 3D Winbench because I have to spend a lot of resources making sure we optimize for 3D Winbench, which is sad. I'd much rather have those people working with game developers and making sure we get the best games. But market reality says I have to throw people at optimizing 3D Winbench.

Every card company is doing that, but it's sad that we have to. It's not money well-spent.

they're only now showing the original *Tomb Raider*. Come on! What's the point? And they'll say, "This is great. Now we have all these games that 3Dfx had." You're going to wait six months for all the hot titles? No way! I'm sure they can get as many titles as we can—with time and money.

boot ***So 3Dfx has never subsidized a developer?***

Sellers To my knowledge, in the consumer segment, no. In the early days when we were focused on this arcade business, we helped some arcade developers with dollars. And that was a disaster. We weren't even thinking about the PC at that time. It was 3Dfx as a publisher. It was terrible. We had no idea what we were doing.

And that doesn't really count.

In terms of getting games for PCs, the answer is no. With the exception of the relationship between GameFX, the *Out of the Void* folks, and 3Dfx. GameFX's founders came to us and said, "We love 3Dfx. We want to say 'Screw all the other boards.' We just want to support 3Dfx. How do we do that?"

So we helped them with some funding, and got them in touch with some investors and things like that, and just kind of seeded them along the way. So it wasn't really buying content; it was more like, "Hey! Let's help people who want to say, 'I'm a 3Dfx house.'" And we've had other people ask us to do that. That's very different than saying, "I'm going to go buy this EA game."

boot ***Have you ever paid developers to not support other chipsets?***

Sellers No. We couldn't afford to even if we wanted to. That whole thing is a disaster waiting to happen. These companies are pouring so much money into trying to push the market forward. It's going to explode back in their face when they realize how much they've spent, and suddenly look at the bottom line, and realize they can't do this anymore. What happens when PowerVR can't write checks anymore?

boot ***The PowerVR folks told us that they will know they've hit it big when you apply for a job with them. When do you see that happening?***

Sellers We recently hired their former director of North American sales, who was a big defector from them. They have a few good people over there that I anticipate hiring, moving forward.

boot ***Would you ever work for PowerVR?***

Sellers Never. I'll tell you why: I actually have an appreciation for their technology because it's new and unique and it might not be the right thing, but from a technology perspective I appreciate people going out on a limb and productizing stuff they believe in.

I have no respect for their sales and marketing tactics, though. It has damaged the industry with the lies and claims that have come out of that camp. There's just no excuse for the things they've done.

boot ***Can you elaborate on that?***

Sellers It starts with things like their Direct3D test. *[ed. note: PowerVR commissioned a Direct3D performance test, but JPA, the people conducting the test, retracted the results after it was discovered that renaming the test app resulted in skewed scores.]* That was a clear—it goes back to the days when the 2D vendor hard-coded the fox jumps over the bear test—it was a clear cheat. And I would never be part of that as an engineer, or as a manager, or as a vice-president. And it's a real ethical statement of how you want to position yourself as a company, and there's no excuse for it. They've never apologized, they've never even really admitted what they did. As a consumer knowing that, I would never buy a product from them.

boot ***So you think they've misled consumers?***

Sellers Absolutely. The new thing is they're going out and telling everybody that Sega has announced that PowerVR is going to be the chipset for the next generation console.

boot ***But Sega hasn't confirmed anything.***

Sellers It's just a different mentality I guess.

boot ***Sega has invested in 3Dfx. But now there's rumors that Sega will go with PowerVR for their next console. Does that concern you?***

Sellers There have been as many rumors about the Sega/3Dfx relationship as there have been about the Sega/PowerVR relationship. The important thing is that those are all rumors.

boot ***So you don't lose sleep over the talk?***

Sellers Well, I lose a little sleep because I know people can be affected by rumors. We are trying to convey 3Dfx as a platform leader and anything that rumors do to hurt that image causes me distress. But the bottom line is that rumors are always squashed at some point.

boot ***If consumers hear that Sega is partnering with PowerVR, do you think that's going to persuade them to buy a PowerVR card for their PC?***

Sellers Who knows? It's certainly a concern. The fact that they are out there promoting those rumors is, in my opinion, a business tactic that I don't think is ethical or should be rewarded.

I could have taken copies of the prospectus with all of the information about us developing for Sega. I could have gone through with a highlighter, and sent a hundred copies out to every electronics magazine.

We are here for the long-term. We want to build relationships with consumers so they'll know we're a quality, ethically driven company. And it has saddened all of us to see others not following the same tack.

boot ***Who do you see over your shoulder?***

Sellers Engineering is pretty paranoid in an Andy Grove paranoid way. We see everyone, and I lose sleep at night, depending on the day of the week, about different competition. Below us, I don't see that anyone has a leg-up over anyone else.

boot ***So they're all basically bad?***

Sellers I wouldn't say they're all "bad," but... You're right, some are bad. But there's at least half a dozen out there that could give us a run for our money.

boot ***If you couldn't use a 3Dfx card in your system, what would you use?***

Sellers First, I'd go out and buy a fast CPU because I'd probably run the majority of my

Horse Riding with EA

boot ***Electronic Arts just invested in 3Dfx. Should other developers be concerned about EA having an advantage in terms of new hardware, drivers, and technology?***

Sellers I will say flat out that is not the case at all. All the major publishers get exactly the same support. EA's commitment to us is their decision to standardize on something that they feel is going to be around. They're just trying to strip away some of the confusion and noise the 40 other graphics chip companies are generating, and say, "We want 3Dfx support in every single title because we believe in 3Dfx, and they're going to be the long-term winner." And they basically picked their horse.

boot ***And they're not "riding any other horses"?***

Sellers I'm sure they are, but this is an endorsement that we're one of the majors that they're going to be targeting.

boot ***But they haven't come to you with an exclusive?***

Sellers No. And I wouldn't expect that.

boot ***Exclusives weren't part of the deal?***

Sellers They still have to target software-only rendering. It doesn't make sense for EA to sign away their life. But they're putting our boards in the machine of every single developer under their umbrella. And we're not paying EA to do this.

boot ***So what are you expectations of the deal?***

Sellers That they work with us to understand our technology and they learn from us how to maximize the type of content that they can develop on 3Dfx.

games software-only. Other boards don't have any titles to run. Then I'd go and buy whatever *boot's* favorite 2D graphics card is.

I don't see any of the other 3D cards as being compelling. I really don't. I wouldn't buy any of them because you're almost buying a piece of hardware for a particular title.

boot ***Who has a chance of surviving?***

Sellers A shakeout is happening now. There are 40 companies developing 3D graphics accelerators, but only about half a dozen have a shot. And those six players are the obvious ones. All these other guys are just no ops right now. Your guess is as good as mine in terms of who's going to win and who's going to fail.

boot ***Who, if anybody, do you respect personally?***

Sellers I respect Andy Grove a lot because he has created a monopoly from nothing really. I can't think of many electronics companies that have been as successful as long as Intel has. You have to respect that. Their pace of product introductions and new engineering is remarkable, and being able to do that in a big company is really wonderful. Not many other companies are able to do that at that size.

boot ***Intel is moving into the 3D market with Auburn. Can they come into this new market and overtake it completely?***

Sellers Historically, they've succeeded doing just that with chipsets, motherboards, etc. They're going to make a run at it, and we are absolutely concerned about their crossing the line in terms of wanting to work with us on the processor side, and us working with them in defining future processors. That crossing is a real issue. And Intel is taking steps to make sure that that doesn't happen, but it's such a big company.

Moving forward, I don't believe Intel is in a better position than any of our competitors. In other words, if we come out with products that are just slightly better than S3, we'll lose. They have a much stronger manufacturing and sales story than we do. And that's Intel's strength coming into this thing. So I know I have to blow away S3, and I have to blow away ATI in the technology features and performance side of things. I look at the same scenario with Intel. And we have to create products that are far and away better than what they offer. **b**

*This follow-up conversation took place after **Sega** had confirmed its decision to use **PowerVR**, instead of **3Dfx**, for its next console.*

boot ***What's your take on Sega's decision, and how it came down?***

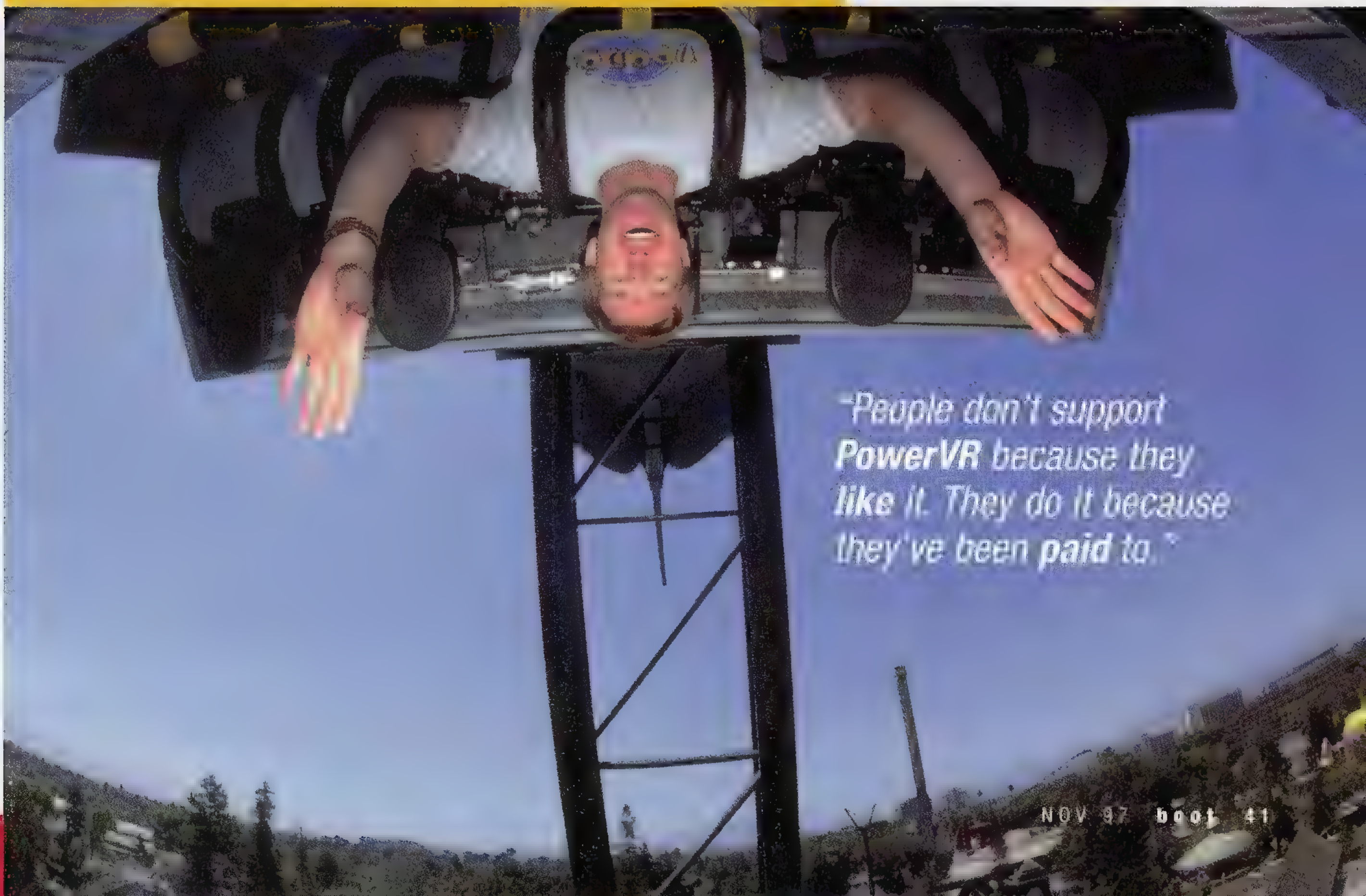
Sellers Obviously, we're very disappointed with Sega's decision. We were extremely excited about the platform that we were working on with Sega, and we were very confident that its performance and features would have propelled console gaming through the end of the century. Sega's decision to not use the 3Dfx solution was not based on either technology or cost factors. Sega has not demonstrated in recent years their ability to make good, sound decisions—look at the 32x and the Saturn as examples—and it now seems they're likely to continue their streak of poor products. It's all very disappointing.

boot ***Were you surprised, especially considering the swirling rumors?***

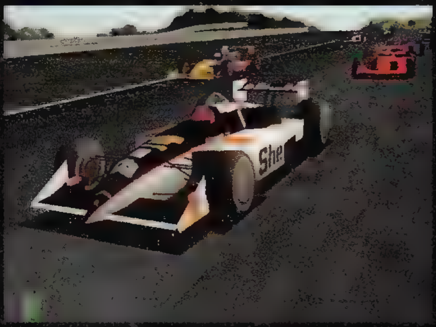
Sellers When we heard the announcement, we were executing above-and-beyond our contract with Sega, so we were of course surprised and disappointed they wanted to cancel the project. Rumors always abound regarding future console development, and we considered them to just be rumors. When you're developing a platform as exciting as what we were doing, and in fact striving for cost, performance and features that were beyond what was required for us to do per the contract, we could never have imagined why anyone would not want to productize it.

boot ***Is it a closed issue?***

Sellers At this point in time, we believe that it's a closed issue, and that in all likelihood Sega will not be using 3Dfx products in a next-generation console. As we've said previously, however, we're still exploring our legal options with regard to taking action against Sega terminating our contract.

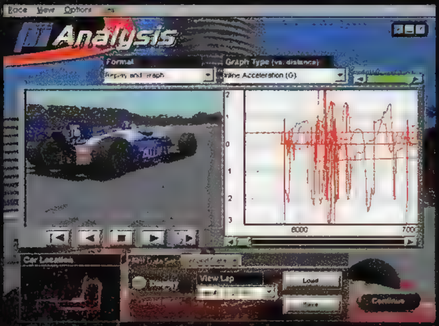


*"People don't support **PowerVR** because they **like** it. They do it because they've been **paid** to."*



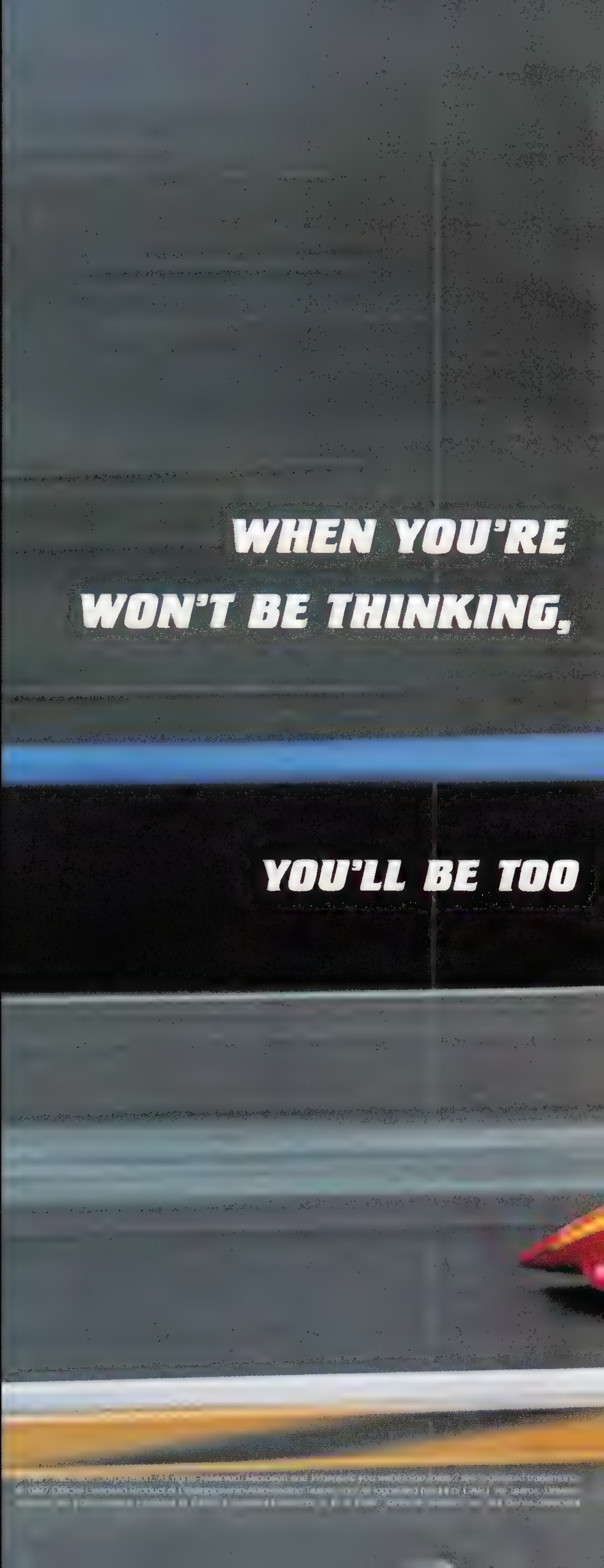
Lap 1 of 13
Place: 1/ 12
Lap Info: 1/ 13
Lap Time: 0:00.00
Current: 0: 18.72
Best: 0:00.00

Garage
DRIVERS
TRACKS
MULTIPLAYER
RACES


Race
View
Options
Analysis
Format
Graph Type (vs. distance)
Car Location
View Lap
Load
Save
Continue

Demo a free practice lap at
microsoft.com/games/precisionracing/cart

Microsoft®
Where do you want to go today?®


WHEN YOU'RE
WON'T BE THINKING,
YOU'LL BE TOO

With Microsoft® CART Precision Racing™ you will see, hear, and feel the same things real CART drivers do. You will race on all 17 official CART tracks, based on razor accurate GPS data. Your view will shift in anticipation of the curves ahead. Your pulse will rev at digitally sampled engine sounds and Bob Varsha's track-side commentary. And with force feedback support, if you take the corkscrew at turn #8 too fast, you're not going to need a monitor to tell you. To improve your lap time, stop into the garage to tweak your set-up, analyze the Pi Research telemetry data or go back to Racing School where Bobby Rahal is instructor-in-residence.

Microsoft
Precision
Racing

GOING 140MPH AT LAGUNA SECA YOU "WOW, WHAT A GREAT GAME."

BUSY GOING 140MPH AT LAGUNA SECA.

Energizer
Coca-Cola
Gillette
TDK
STP
TARGET

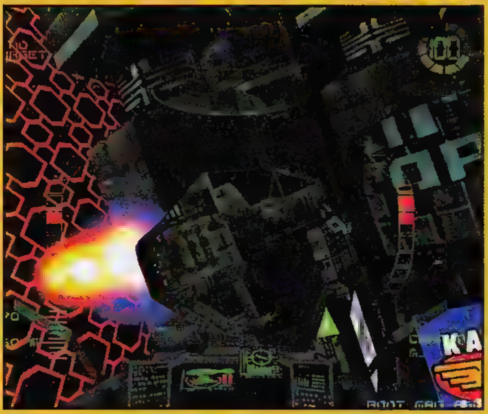
and Precision Racing is a trademark of Microsoft Corporation.
[illegible]

AGP THE GAMER'S EDGE

*Don't let the **PCI bus** fail you when you need **3D performance** the most. **AGP** promises faster **frame rates** and gorgeous **textures**, ushering in a bold **new** world of **high-res** bliss*

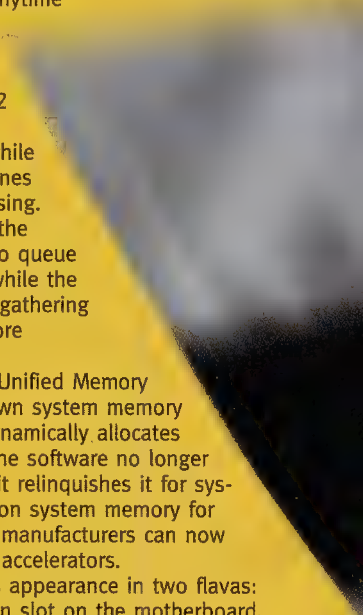
The PCI bus was a breakthrough for handling the congestion created by heavy-duty 2D graphics, but 3D demands have created graphics grid lock. Now Intel's Accelerated Graphics Port promises to bust the PCI bottleneck wide open.

AGP uses two devices to speed the flow of traffic: a faster expansion bus (66Mhz as opposed to the 33MHz PCI limit), and, more importantly, straight pipeline access to system memory. Now higher resolution textures can be stored in system RAM instead of precious local video memory. Parlaying these savings, AGP cards can use local memory for higher resolution frame and Z-buffers. Games will finally abandon blocky 32x32 pixel textures, and get serious with 256x256 pixel textures and larger. The AGP-enhanced version of *G-Police*, for example, comes alive with high-res full-motion video textures of electronic billboards dotting the sides of buildings.



If AGP is detected,* G-Police *bumps up textures from a measly 4MBs to more than 15MBs of goodness.

Keep in mind, AGP is not a replacement for PCI, so don't expect motherboards with more than one AGP slot anytime soon. Similar to the PCI 2.1 spec, AGP's single expansion slot provides 32 lines for multiplexed address and data, while adding eight more lines for sideband addressing. Sidebanding allows the graphics processor to queue new data requests while the main bus continues gathering data, resulting in more efficient transfers.

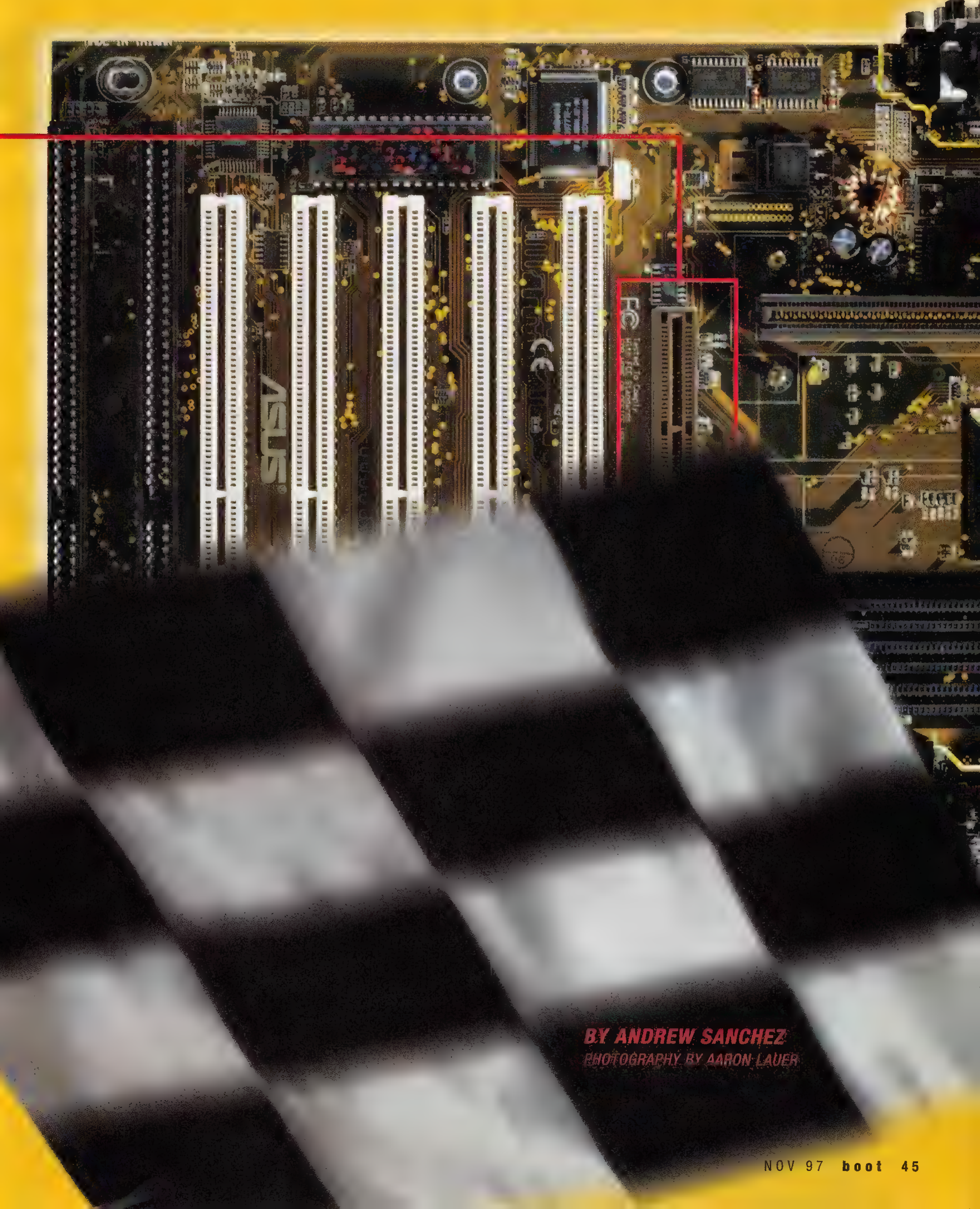


Unlike the failed Unified Memory Bus, which locks down system memory for graphics, AGP dynamically allocates system memory: If the software no longer needs the memory, it relinquishes it for system use. By relying on system memory for textures, video card manufacturers can now make lower-cost 3D accelerators.

AGP will make its appearance in two flavas: as a single expansion slot on the motherboard, or as an AGP-compliant video processor built into the motherboard. You can can't have it both ways, so unless you really love that on-board video processor, go with the single expansion slot. Of course, if you choose to go with an on-board solution, you should still be able

47>

AGP



BY ANDREW SANCHEZ

PHOTOGRAPHY BY AARON LAUER

The New Breed of Acceleration

*Three first-gen **AGP cards** cozy up to that lonely new slot*

Screenshots are 800x600 in 16-bit color from Acclaim's forthcoming Direct 3D game *Forsaken* and illustrate the benefits of AGP

Number Nine **Revolution** 3D AGP

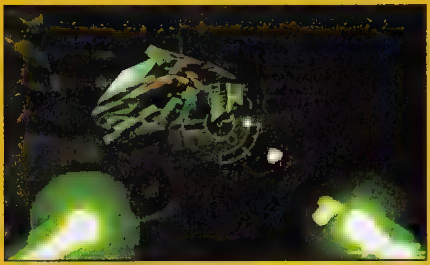
Number Nine's Revolution 3D has walked our gauntlet before back in *boot* 13—but this time, it's ditched PCI for AGP. If you didn't catch the video card's specs last time, here's a quick refresher course: The Revolution 3D is a high-end "prosumer" video card capable of accelerating all your favorite APIs. On top of blindingly fast Windows 2D performance, the Revolution 3D supports DirectX (including DirectDraw and hardware accelerated Direct3D), OpenGL (full NT drivers, not mini/*GLQuake*), and more for all your work needs. Using its own Ticket To Ride 128-bit 2D/3D video processor, and coupled with 8MB of dual-ported WRAM (expandable to 16MB) and a 220MHz IBM RAMDAC, the Ticket To Ride conforms to AGP 1x specifications, but opts for DMA Mode and uses no sidebands. The 3D accelerator has a hardware setup engine to help push those polys as well as a full set of D3D features.

Revolution 3D: Still a better 2D card than 3D performer.

Price $399
Company Number Nine
Phone 617.674.0009
URL www.nine.com

ASUSTek **3DexPlorer** V3000

ASUSTek's AGP video card comes out hitting hard with nVidia's Riva 128 3D accelerator—easily one of the most anticipated processors to enter the bootLab in a long time. The 3DexPlorer 3000 comes with 4MB of 128-bit, 100MHz SGRAM coupled with a 206MHz RAMDAC. The Riva 128 2D/3D processor is built from the ground up as a Direct3D accelerator, with a full 5GFLOP floating point setup engine, and integrated vertex and texture cache to push all your favorite D3D games into the 3Dfx performance realm. The 32-bit VGA core handles all your legacy DOS support, and VESA 2.0 compliance is hardwired into the BIOS. While the Riva 128 can handle TV-in and video-out, this current revision doesn't have it, although ASUSTek, the boffo motherboard company, plans to release a version with them by the time you read this.

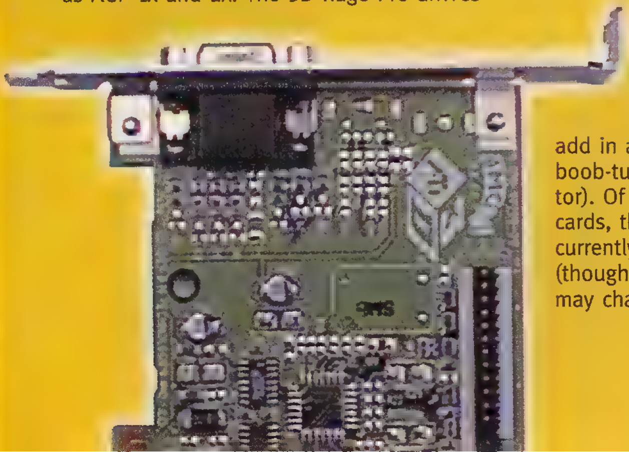


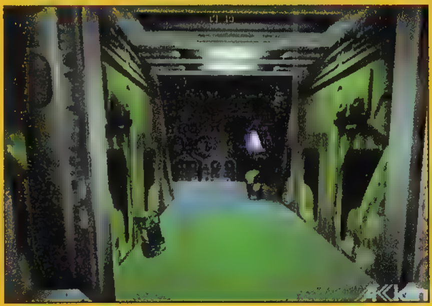
Using the Riva 128, D3D games are liquid lightning.

Price $149
Company ASUSTek
Phone 408.474.0567
URL www.asus.com

ATI **XPERT**@Play

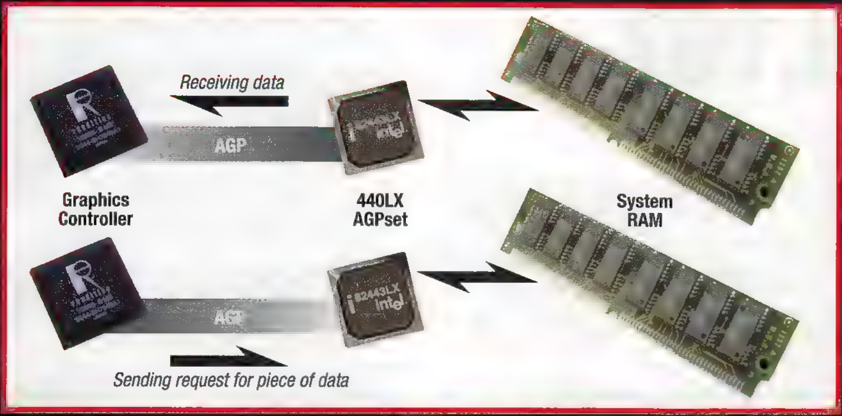
Based around its 3D Rage Pro processor, ATI's XPERT@Play will be one of the few video cards that will come in PCI as well as AGP 1x and 2x. The 3D Rage Pro arrives with all the fixings you'd expect, including an integrated triangle set-up engine, VESA 2.0 support, and Direct3D and OpenGL support. You'll be able to choose from 4MB and 8MB models, and the cards will incorporate TV-out so you can play D3D games on the big screen (you'll need to add in a dedicated TV tuner to enjoy boob-tubing on your computer monitor). Of all the first generation AGP cards, the ATI and nVidia chips are currently the strongest contenders (though Rendition's V2200 AGP part may change all that).



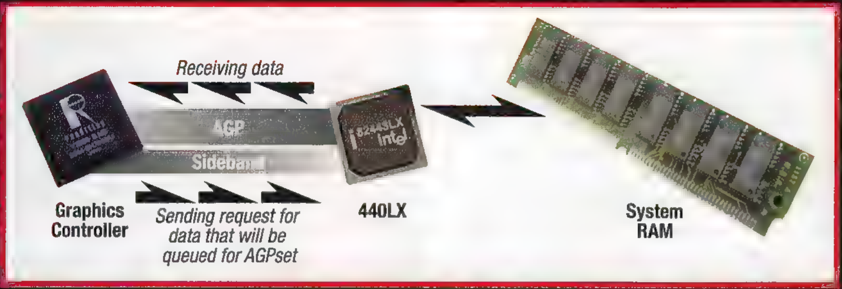


Eight megs give you high resolutions and color depths.

Price $149
Company ATI Technologies
Phone 905.882.2600
URL www.atitech.com



AGP WITHOUT SIDEBANDS *Think of this data bus as a one-way street that constantly changes directions. If data is coming upstream from system memory, data requests cannot be sent downstream until incoming data is completely clear.*



AGP WITH SIDEBANDS *Think of sidebanding as a one-way alley that provides a shortcut for AGP access requests. Using the 8-bit sideband address port, requests are sent downstream to the AGPset, maximizing the efficiency of the memory bus. As the main bus gathers data from system memory and the AGPset, the sideband sends requests for data that will be queued for the AGPset. Currently, only ATI's 3D Rage Pro fully supports AGP 2x with sidebanding.*

Different Flavors of AGP

The AGP roadmap for the next 12 months will concentrate on the following four incarnations, each with its own pluses and minuses.

AGP 1x Local texturing (or DMA Mode) The cheapest and absolute lowest level of AGP. Cards must copy entire textures from system memory into their own local frame buffers before sending them off to the video processor. Local texturing is how current PCI graphics cards implement texture copying—but with AGP you get the faster 66MHz bus.

AGP 1x/264MB/s with AGP Texturing (or Execute Mode) Compliant parts can pull portions of textures from system memory directly into the video processor, and also use local memory for texture memory management. While any 440LX motherboard can use AGP with sidebands (up to 2x), it's up to manufacturers to retool their 3D accelerators for sidebands. You should check with each video card manufacturer before making the plunge.

AGP 2x/528MB/s with AGP Texturing AGP 2x with sidebands is the realm where acceleration really kicks in. In AGP 2x, two 32-bit data chunks are transferred per each 66MHz cycle, effectively doubling the transfer rate to a glorious 133Hz. Current 440LX AGPset technology limits the system memory bus speed at 66MHz, causing a bottleneck at the memory system end. Until the 440BX AGPset with its 100MHz system bus comes along and is linked with 100MHz system SDRAM, you may not be getting all you can squeeze out of 2x (though you will get a speed increase).

AGP 4x/1GB/s and AGP Texturing By Q4 of 1997, the spec for AGP 4x should be complete. Four 32-bit data chunks will be transferred per each 66MHz cycle, resulting in a screaming 266MHz speed demon. With AGP 4x, sidebanding is mandatory. Thus the new AGP spec could conceivably be closely linked with Intel's next-gen processor and core-logic AGPset, which rely on RAMBUS technology (although it's unknown at the moment whether the next-gen 440BX AGPset will support 4x). The earliest AGP 4x video cards will most likely appear around 1999.

>44 to slap in a PCI-based 3D card, if you desire.

To use AGP, you'll need Windows 95 OSR2.1 build 1212 (USB support and the new VMM32.VxD memory manager is required for AGP), DirectX 5.0, and the AGP VGARTD.VxD file (which acts as liaison between the AGP card and your OS via DirectX 5.0). Video card manufacturer will ship their own VxD files with the required DirectX 5.0 drivers, so taking advantage of AGP-enhanced programs is as simple as installing the correct drivers.

If you don't know your rev of Windows 95, use the bootMark utility found on every *boot*Disc. If you have Build 1111 and want 1212, download the USB supplement patch found on Microsoft's and Intel's web sites. If you're still grinding on OSR1, snatch the correct build of OSR2.

Once you've got your OS primed, you'll need three hardware components for AGP acceleration: the right CPU, an AGP core-logic chipset, and an AGP video/3D card. Within this scheme, Intel and AMD are embroiled in a dogfight.

The Intel model centers around the Pentium II and 440LX core-logic chipset. Intel says any Socket 7 model will bottleneck at the CPU/L2 cache throughput, which peaks at around 500MB/sec for current Socket 7 CPUs. The P-II's closely coupled L2 cache—which scales to core processor speeds—is better suited for AGP processing, according to Intel.

AMD disagrees and is offering AGP Socket 7 parts. Centering around the next-gen K6 processor with 100MHz system bus, core logic chipsets based on AMD's 640 PCIset, Ali's Aladdin IV+, and VIA's Apollo VP3 are preaching full AGP compliance. Until these products appear, we can't determine whether a Socket 7's memory interface can handle the amount of data that AGP pushes. 53>

*Unlike the **failed** Unified **Memory Bus**, which locks down **system memory** for graphics, **AGP** dynamically **allocates** system memory: If the **software** no longer needs the **memory**, it relinquishes it for **system** use.*

ASUSTek **P2L197**

The first of a new breed

boot KICK-ASS! PRODUCT

ASUSTek grabs the spotlight by getting the first AGP motherboard into our sweaty little hands, and boy, does the P2L97 rock.

The first thing you'll notice about the board is the revolutionary new AGP slot—it's shorter than a PCI slot, and oh-so-sexy. All in all, this baby-ATX motherboard is an ISA-hater's dream. A single AGP 1x/2x slot, four bus-mastered PCI slots, a single ISA slot, and a shared PCI/ISA slot comprise the seven total expansion slots available.

The dual-layer ATX I/O connector has everything you'll ever need, including integrated twin USB ports. Three DIMM sockets get your 168-pin unbuffered SDRAM/EDO-DRAM up to 384MB. The system BIOS includes LS-120/SuperDisk/Zip support, and UltraDMA/33 support for lightning-fast EIDE devices. Overall, the motherboard is cleanly designed. Everything's within easy access, with no header connectors or DIMM slots bunching up against each other, despite the baby-ATX form-factor. The CPU fan power connector is conveniently located near the processor, while two other power header connectors lurk in the shadows.

The P2L97's jumperless motherboard design is very cool. All settings normally relegated to jumpers or DIP switches are located inside the system BIOS, so overclockers can monkey around with the dark arts without having to crack open their cases. The motherboard supports up to 300MHz. You can go with either pre-set clock settings, or manually adjust multipliers and system bus frequencies (choices include 50, 60, 66, 68, 75 and 83MHz). Other BIOS settings include the new Graphics Aperture Size for AGP memory mapping, Video Memory Cache Mode, and a complete Power Management Setup section where the BIOS can monitor your CPU core voltage, control fan speeds, and more.

Of course all this nouveaux funky-monkey technology doesn't mean poop if real-world performance blows. But the P2L97, with its 440LX core logic chipset, performs like a champion, breaking almost all of our 440FX motherboard speed records with a vengeance. From bootMarks to FastVid *Quake*, this motherboard sizzles, whether at 233MHz or overclocked at 266MHz. Particularly impressive are the *GLQuake* benchmark scores, which posted 32.9fps at 233MHz (4.5fps faster than the previous 440FX record), and 35.8fps overclocked at 266MHz (7.4fps faster than the previous high score). DMA access speeds are the highest seen yet on any P-II board. The one disappointment was the overclocked scores on the *MDK* PerfTest, which were nearly indentical to the 233MHz scores.

Resist all you like, but ASUSTek's P2L97 motherboard is an excellent upgrade if you're fiendin' for some sexy AGP.

Price $250
Company ASUTek
Phone 408.474.0567
URL www.asus.com

boot verdict 9

The Intel 440LX AGPset: Your Path to AGP Enlightenment

Here are all the stats and figures you could ever want or need about the latest core logic chipset. A two-chip solution, the 440LX is specifically engineered for Pentium II use, so all you Pentium Pro fans are left with the 440FX. Unfortunately, Intel hasn't fixed the problems with banked-write combines and cache-posting cache writes that plague P-Pro chipsets. Keep your copy of FastVid handy—you'll need it.

Processor support *Pentium II 233MHz–333MHz* ***RAM support*** *1GB of EDO-RAM, 512MB of SDRAM* ***AGP support*** *yes (2x with sidebands)* ***Number of AGP slots*** *one* ***ACPI support*** *yes* ***ECC/Parity*** *yes* ***Maximum bus speeds*** *33MHz PCI, 133MHz AGP, 66MHz system bus* ***USB support*** *yes* ***Number of CPUs supported*** *two* ***Ultra DMA/ATA-3 support*** *yes, PIO Modes 3 and 4, and Bus-master IDE DMA Mode 2*

Dare to Compare

AGP aside, how does the P2L97 and its 440LX core logic set compare to 440FX motherboards? Look for the bolds, baby. Look for the bolds.

Benchmark	*ASUSTek P2L97(440LX) 233MHz/266MHz*	*A.I.R. P6KPI (440FX) 233MHz/266MHz*	*Tyan S1684SA (440FX) 233MHz/266MHz*
bootMark	***114.2/129.4***	*113/128*	*108.7/128.7*
Memory speed	*97/101.3*	*96.4/105.3*	***105.1/116.4***
Quake (fps)	***14.8/15.6***	*14.0/14.5*	*14.3/14.8*
FastVid Quake (fps)	***25.1/27.9***	*22.9/25.0*	*23.6/25.9*
GLQuake (fps)	***32.9/35.8***	*28.4/28.4*	*28.4/28.4*
DMA access (MB/sec)	***50.8/50.8***	*36.3/34.0*	*37.3/37.4*
L2 cache speed (MB/sec)	***245/280.1***	*244/279.3*	*243.8/278.6*
MDK PerfTest	*83/83*	*83/102*	***83/112***

Bold indicates better score

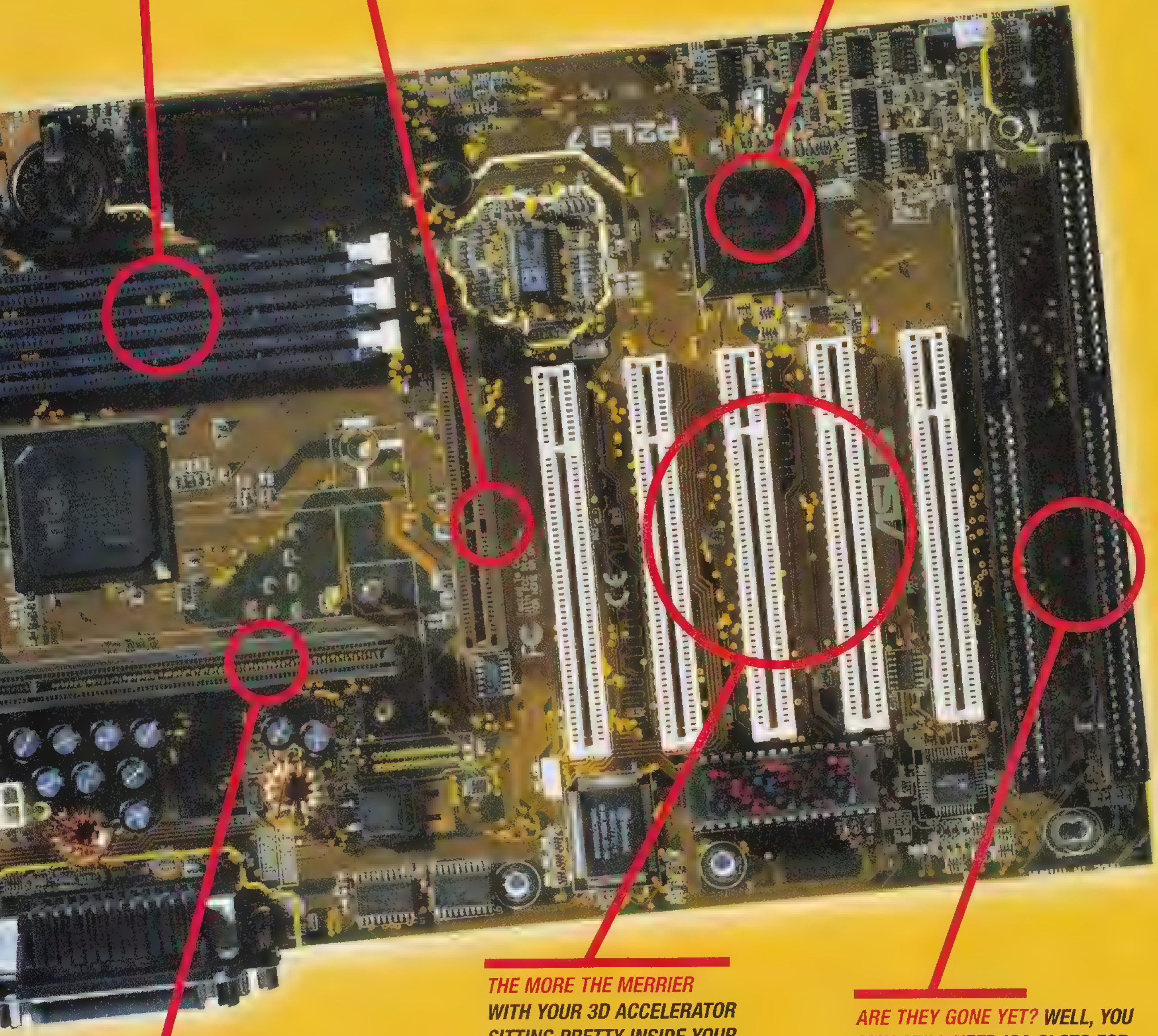
Benchmarks were performed on the following control system: ***Processor*** *Intel Pentium II 233Mhz* ***PCI Video/3D*** *4MB Rendition Verite V1000 reference board; Diamond Monster 3D with 3Dfx Voodoo* ***O/S*** *Windows 95 OSR2.1 Build 1212B* ***RAM*** *32MB on single DIMM* ***CD-ROM Drive*** *Mitsumi FX-120T 12x EIDE CD-ROM* ***Hard drive*** *Quantum Fireball 1.2GB EIDE* ***Sound Card*** *Creative Labs AWE32*

***GOODBYE, AT** THE MAJORITY OF AGP/P-II MOTHERBOARDS WE'VE HEARD OF ARE ALL ATX. INTEL IS PLANNING ON A MODULAR NLX FORM-FACTOR BOARD, BUT GOOD OL' AT 440LX BOARDS ARE FEW AND FAR BETWEEN.*

DIMMI MORE! THOSE 168-PIN DIMM SOCKETS ARE READY FOR ALL YOUR RAM NEEDS. IF YOU GO WITH SDRAM, YOU'LL MAX OUT AT 512MB, BUT IF YOU'RE WILLING TO GO WITH EDO, YOU CAN DO THE ONE GIG JIG.

GET ON THE BUS YOUR JOURNEY INTO THE AGP REALM BEGINS WITH THIS LITTLE EXPANSION BUS. AND DON'T WORRY ABOUT INCOMPATIBILITY: THIS BUS IS READY FOR 1X AND 2X AGP IMPLEMENTATION, EVEN WITH SIDEBANDS. SO FIND YOURSELF A SEXY NEW VIDEO CARD, AND PUSH SOME BEAUTIFUL TEXTURE-MAPPED POLYGONS TOGETHER.

THE POWER'S IN THE AGPSET HERE IT IS: THE FIRST OF MANY CORE-LOGIC CHIPSETS FROM INTEL THAT'LL HARNESS THE POWER OF AGP. THE 440LX WILL HANDLE UP TO 2X AGP (WITH SIDEBANDS), BUT THE 66MHZ SYSTEM BUS MAY CAUSE A TRAFFIC JAM—AT LEAST UNTIL 100MHZ SDRAM AND THE NEXT-GEN AGPSET COMES ALONG.



P-II FOR YOU WITH INTEL'S FORMULA, YOU'LL NEED THE ALMIGHTY PENTIUM II PROCESSOR IF YOU WANNA DIG THE AGP SCENE. BUT AMD HAS THINGS TO SAY ABOUT THAT, AND THIS CHRISTMAS YOU'LL SEE SOCKET 7/AGP MOTHERBOARDS VYING FOR ATTENTION.

THE MORE THE MERRIER WITH YOUR 3D ACCELERATOR SITTING PRETTY INSIDE YOUR AGP SLOT, YOU'LL HAVE SUNDRY SLOTS READY FOR ALL THOSE COOL PCI PERIPHERALS YOU'VE ALWAYS WANTED.

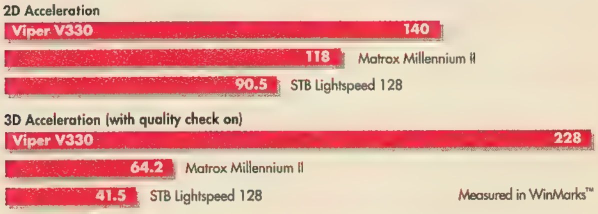
ARE THEY GONE YET? WELL, YOU MAY STILL NEED ISA SLOTS FOR SOMETHING, SUCH AS A SOUND BLASTER OR VERY COOL MIDI CARD. BUT ONCE THE PC98 SPEC IS FINALIZED, YOU CAN BET YOUR BOTTOM-DOLLAR THAT ISA WILL DIE. HALLELUJAH!

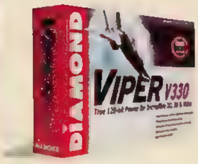
[illegible] "Control" system based on [illegible] 266 MHz MMX CPU, [illegible] cache, 32MB EDO DRAM, and 1.6GB hard drive. All products were tested in [illegible] ZD WinBench 97 Business graphics at 1024x768x16bpp at [illegible] Hz. 3D test was done using ZD' 3D WinBench 97 vers.1.0 at 640x480x16bpp at [illegible] Diamond Viper [illegible] BIOS:1.9, mem 4MB SGRAM), Matrox Millennium II (3.61.005/5-12-97, BIOS:1.0, mem 4MB WRAM), STB [illegible] 4MB WRAM). Tests performed with independent verification by ZD. ZD makes no representations/warranties as to results. The STB Lightspeed 128 accelerates 3D in software [illegible] Windows is a ® of Microsoft Corp. Pentium is a ™ of Intel Corp. [illegible] is a ® of Interactive Magic. Moto Racer is a ® of Delphine Software Int'l. All other brands and [illegible] Diamond Multimedia Systems, Inc. 2880 Junction Avenue, San Jose, CA 95134. All rights reserved.

Our new Viper accelerator is so fast, we couldn't get anyone else to test it.

INTRODUCING THE TRUE 128-BIT ACCELERATOR.

- Record-breaking acceleration for Windows® NT and Windows® 95
- Phenomenal 3D frame rates—supports 20 billion operations/second
- Engineered for Direct3D—the most widely-supported game API
- Advanced video features—supports TV-out for big screen computing
- Provides seamless upgradeability to TV tuner, video capture, and DVD
- Bundled with 8 hot business and gaming software titles, including iF-22™: The Realistic Simulation of the F-22 Raptor and Moto Racer





Get ready to think fast with the ultimate 2D, 3D, and video accelerator. Diamond Multimedia's amazing new 128-bit Viper® V330 leaves all those 64-bit cards and the other "so called" 128-bit cards in the dust. The Viper, powered by NVIDIA's RIVA 128 chip, blazes through the most complex 2D business graphics with its huge 1.6GB per second bandwidth and 4MB 100MHz SGRAM memory. And, with its explosive new 3D engine, it won't ever compromise screaming fast frame rates for phenomenal animation and visual quality. As a result, the Viper delivers stunning realism for your 3D business and entertainment applications. If our unofficial testers could talk, they'd tell you that no other accelerator brings together such an impressive combination of 2D speed and 3D graphics.

DIAMOND
MULTIMEDIA
Accelerate your world.

Win a new 128-bit Diamond Viper accelerator! Visit us at www.diamondmm.com/viper to enter today.

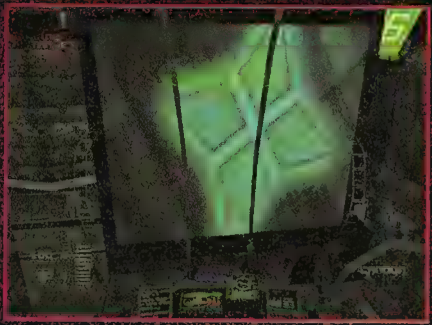
AGP IN ACTION

Wondering what AGP will do for you? Look no further than Psygnosis' G-Police. Armed with more than 15MBs of textures, its dark, futuristic skylines assume a Blade Runner-esque feel, with full-motion video advertisements dotting the high-rise buildings. These aren't slide-show phonies—we're talking 100 frames of video streaming from your system memory into the AGP accelerator in real-time.

These shots show an in-game advertisement for WipeOut XL's breakneck hovercraft racing. Other billboards showcase Assault Rigs and other cool stuff.

Where can game developers go from here? How about higher-res terrain texture maps for flight sims, so the ground doesn't dissolve into bilinear filtered glop. Or, better yet, a first-person game with high-res animated textures for facial expressions, wounds, and more!

High-res textures make arcade scorchers such as Sega's Virtua Fighter 3 look so damned hot. Now it's up to PC game developers to think past the current 2MB to 4MB texture mentality, and start drowning us in those 1024x1024 sharpies.



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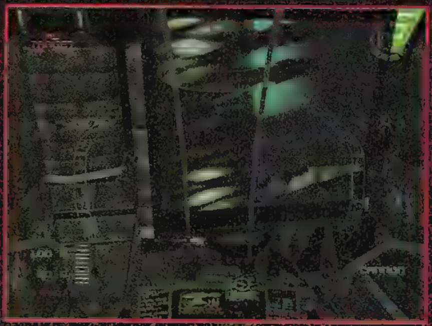

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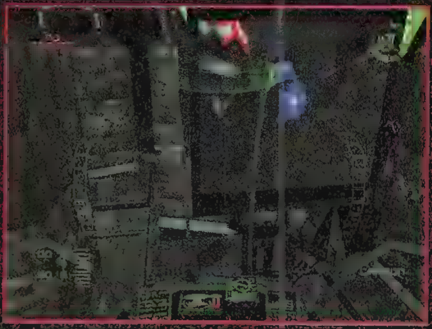
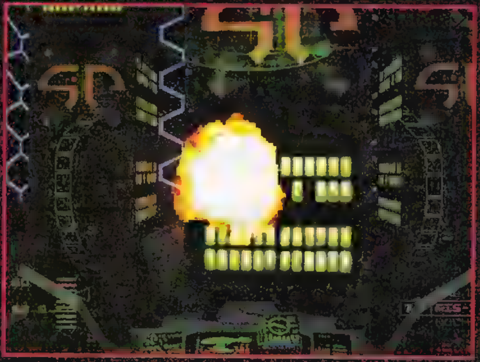


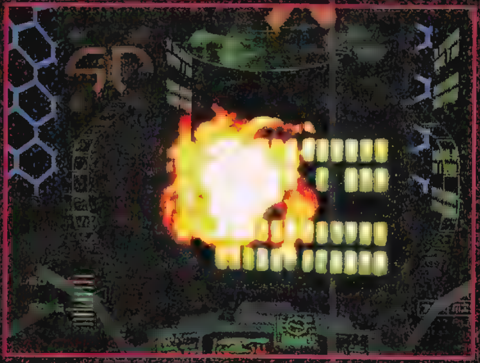
③

THE DIFFERENCE IS IN THE RESOLUTION

The following screenshots illustrate AGP's ability to use higher resolution textures for better special visual effects. The left screenshot is G-Police using local texturing only. Note the pixelated explosion: When animated, it's not as smooth. The right screenshot is AGP-enabled G-Police. The explosion uses higher resolution textures, resulting in sharper visuals. Also, there's more frames of animation—whoo-hoo!



PCI



AGP

Bus-on-Bus Violence

We pitted the Revolution 3D's PCI and AGP cards against each other in a flurry of benchmarks, and for kicks, tossed in the ASUSTek 3DexPlorer V3000 and ATI's XPERT@Play for comparative purposes. As you can see, the faster bus provides a slight performance increase in non-AGP enhanced games. But expect games such as the AGP-ready G-Police to validate AGP's vast potential. And always remember: Your particular 3D chipset plays the largest role in performance.

Benchmark	Revolution 3D PCI	Revolution 3D AGP	AGP3DexPlorer V3000	EXPERT@Play AGP
Quake 320x200	53.2 fps	56.7 fps	59.4	57.8
Quake 640x480	12.9 fps	13.3 fps	14.8	21.3
Quake 800x600	8.6 fps	9.3 fps	10.1	16.1
MDK PerfTest	110	112	99	111
TerraMarks (Lvl 1/2/3)	199/200/failed	200/200/failed/	379/380/379	340/330/failed

Benchmarks were performed on the following system setup: **Motherboard** ASUSTek P2L97 **Processor** Intel Pentium II 233Mhz **O/S** Windows 95 OSR2.1 Build 1212B **RAM** 32MB on single DIMM **CD-ROM Drive** Mitsumi FX-120T 12x EIDE CD-ROM **Hard drive** Quantum Fireball 1.2GB EIDE **Sound Card** Creative Labs AWE32

Who's Making AGP Parts?

AGP motherboards and video cards are about to explode on the OEM and retail scene. Below is a small smorgasbord of the latest parts we've heard about. Some are in development, others are already shipping. If your favorite vendor isn't listed, fear not. Everyone's gearing up for the AGP drag race.

P-II/440LX Motherboards

Manufacturer	Model	Processors supported	# of PCI ISA /shared	Form-factor	# of SIMM/ DIMM
Aopen	AX6L	1	3/2/1	ATX	0/4
ASUSTek	P2L97	1	4/1/1	ATX	0/3
	P2L97-S *	1	3/1/1	ATX	0/3
	P2L97-DS*	2	3/1/1	ATX	0/4
A.I.R.	P6-LDX *	2	3/2/1	ATX	0/4
Intel	AL440LX	1	3/1/1	ATX	0/3
	DK440LX*	2	3/1/1	Extended ATX	0/4
	NX440LX	1	depends on riser board	NLX	0/3
Micronics	Tigercat	1	3/1/1	ATX	0/4
	Spitfire *	2	2/1/1	Extended ATX	0/4
SuperMicro	Super P6DLH	2	7/2/1	Full AT	0/4
	Super P6DLF	2	3/2/1	Full AT	8/4
	Super P6DLS *	2	3/2/1	ATX	0/4
	Super P6DLE	2	3/2/1	ATX	0/4
	Super P6SLA	1	3/2/1	ATX	0/3
	Super P6SLE	1	3/2/1	Baby AT	4/3
	Super P6SLS *	1	3/2/1	ATX	0/4
Tyan	Tiger 2	1	4/1/1	ATX	0/4
	Thunder 2*	2	3/1/1	Extended ATX	0/4

* includes on-board SCSI

Video/3D Cards

Manufacturer	Chipset	AGP speed	Sidebands?	DMA/execute mode
Matrox	Millenium 2	1X	no	DMA
3Dlabs	Permedia2	1X	yes	Both
ATI	Rage Pro	2X	yes	Both
	Rage LT Pro	1X for laptops		
Chromatic Research	Mpact 2	1X	no	DMA
Cirrus Logic	Laguna 3DA 5465	1X	no	Both
Intel	i740	2X	yes	Both
PowerVR	PMX1	2X	yes	Execute
Number Nine	Ticket2Ride	1X	no	DMA
NVidia	Riva 128	1X	no	DMA
Trident	975AGP	2X	yes	both
S3	ViRGE GX2	1X	no	DMA
Rendition	V2200	1X	no	DMA
3Dfx	Banshee	will have "full" AGP		

>47

Games that leverage AGP's riches are already in development. Psygnosis' *G-Police* and Rage Software's *Incoming* promise AGP support out of the box, as does Eidos' *Flying Nightmares 2*. Game FX's gorgeous space combat epic *Out of the Void* is also an AGP contender. In time, all self-respecting 3D game developers will exploit the texture and memory allocation liberties that AGP provides. As id's John Carmack says, "AGP doesn't require any effort to use."

And don't let any developer pull that "lack of installed base" crap on you. Major manufacturers such as Hewlett-Packard, Micron and Intergraph are currently shipping AGP systems. If you simply want to upgrade, see the chart to the left for the skinny on AGP motherboards and video cards. Read pages 46 and 48 for the poop on parts we've played with.

When to **Upgrade**

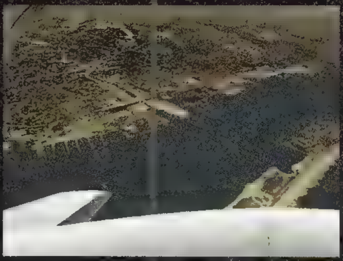
AGP is your future PC video bus. The real question is, When should you make the plunge? If the game you play doesn't support large, high-resolution textures, then AGP will not give you any noticeable improvements over what you have right now. It will barely speed up *Quake*, nor put hair on your chest. Games that profit from AGP must be Win95/DirectX 5.0 titles running under OSR2.1 Build 1212B. Since many game developers must by necessity target a wide range of 3D cards (including bad ones), AGP software will amount to a trickle for the time being.

If you're worried about obsolescence with AGP 2x coming around the corner, don't fret—the 440LX AGPset supports both 1x and 2x, and the expansion slot remains the same. So, in five to six months, when your favorite company puts out its AGP 2x part, you can yank out the old, and slide in the new with no surgery whatsoever. If you decide to snatch up an AGP motherboard right now, you may find yourself on quite a video card quest. Despite major manufacturers hopping on the 66MHz bus, the majority of first-gen AGP video cards are heading straight for system manufacturers, not retail shelves.

Also, many video card makers figure that because AGP is such a new technology, system manufacturers will integrate it into their systems, thus making aftermarket demand incredibly low. The initial confusion on the retail front between the new and old formats only lowers the chances of seeing any type of shrink-wrapped boxed product in stores.

The bottom-line: Don't expect massive, earth-shaking 3D until AGP 2x and AGP-optimized games come along. But AGP Act One is indeed a great start. ▯

It not only sets a new standard in flight simulation, but goes well beyond anything out there. Introducing Sierra



Pro Pilot. Never before has a single flight simulator captured this experience so completely. Here, you'll find the broad strokes and the fine touches. You'll choose from

WE DIDN'T SET OUT TO JUST A SMALL PART OF

a hangar of five civilian aircraft, ranging from the introductory Cessna 172 Skyhawk to the dual-throttled thrill of a Citation Jet. At the other end of the runway are 29 cities and over 3,000 airports, each rendered in exacting detail. All major

KIDS TO ADULTS
K-A
CONTENT RATED BY
ESRB

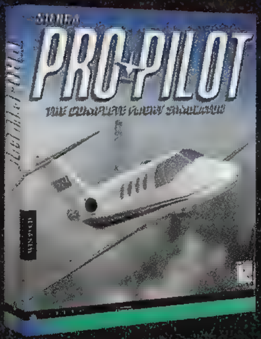
PRE-FLIGHT CHECKLIST

- ☑ 3,000 AIRPORTS NATIONWIDE/100'S OF CITIES
- ☑ 27 MILLION ELEVATION POINTS
- ☑ GLOBAL POSITIONING SYSTEM
- ☑ LIVE ON-LINE MAP DISPLAY
- ☑ AIR TRAFFIC CONTROL
- ☑ EVALUATED FLIGHT ASSIGNMENTS
- ☑ FLIGHT TUTORIAL
- ☑ PHOTOREALISTIC PANELS
- ☑ DUAL THROTTLES FOR MULTI-ENGINE AIRCRAFT
- ☑ CROSS-COUNTRY NAVAID COVERAGE

Dynamix

rivers, forests and canyons are afforded such faithful geographic representation they could double as a map. Within 25 nautical miles of any city, the flying world is rendered with lifelike realism. You'll hear from Air Traffic Control and other pilots, and learn to navigate the sky with the close company of other planes. Then, upon touchdown, debrief and compare your performance to over 30 full-motion preparation videos. This is Pro Pilot: The Complete Flight Simulator. Both a statement of what a flight sim should be today, and the promise of what one can be tomorrow.

CHANGE THE WORLD.
IT CALLED THE SKY.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www.sierra.com/propilot

Product Information Number 309

Stalking the Rebel OS

5 alternative operating systems for PC freaks on the fringe

Linux
2.0
Be
OS
Rhapsody
OS/2
Linux

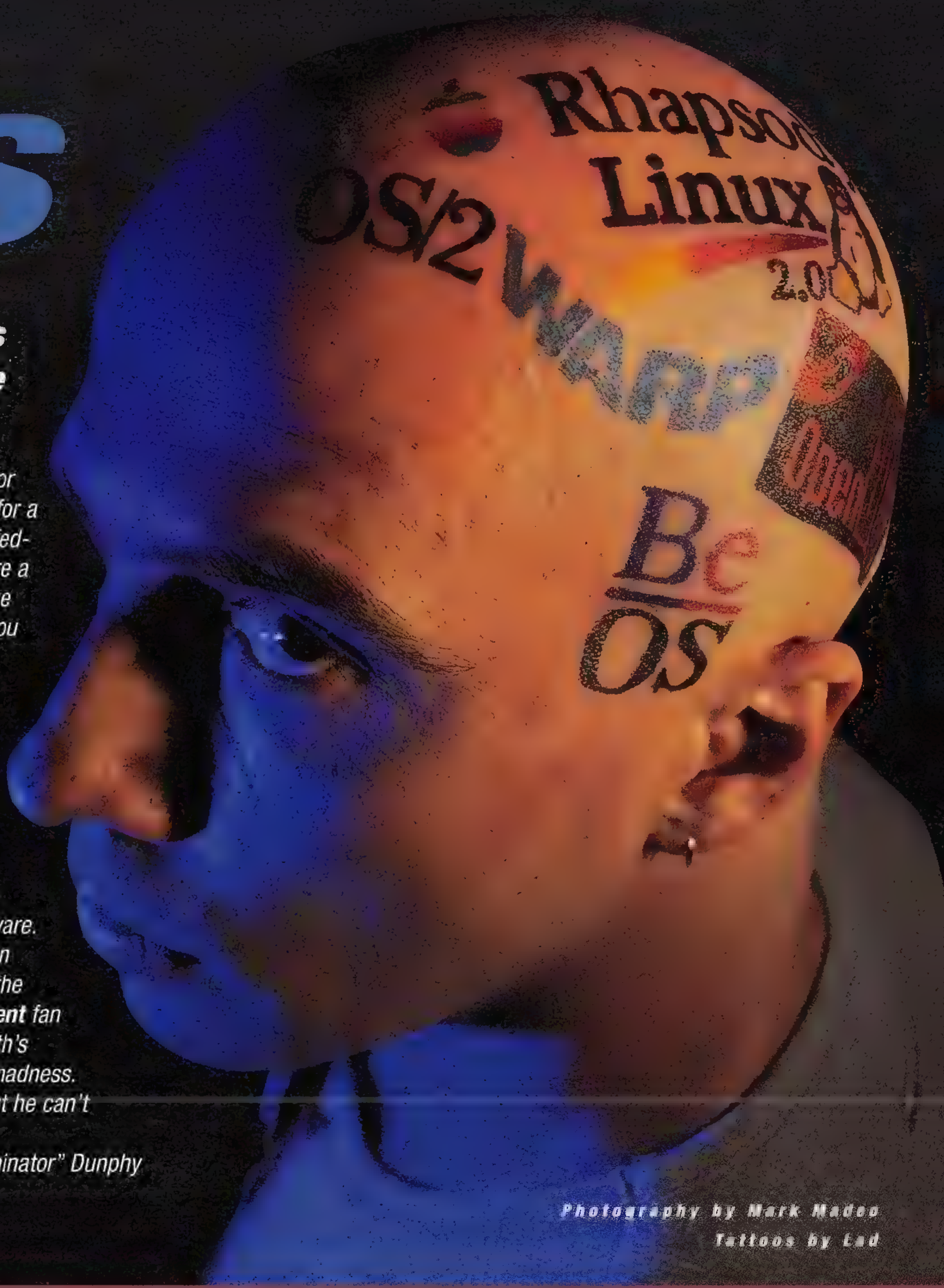
Windows 95 is a 32-bit extension to a 16-bit **patch** for an 8-bit **operating system** that was originally coded for a 4-bit microprocessor. It was written by **suits** and stuffed-shirts for mainstream automoton **lemmings**. But you're a rebel. You listen to Butthole Surfers. You eat rattlesnake meat. You wear a kilt. And by any means necessary, you pump your Intel silicon with an **alternative OS**.

Life **without Microsoft** is not only possible, it can actually be damn pleasant. **Alternative** operating systems let you do things impossible under Windows, and can **push your machine** to **performance** heights you never thought possible. Best of all, some of **best** alternative OSes are **free**.

Unfortunately, you must pay a price for living on the fringe. Forget about using most **software** applications, not to mention compatibility with obscure hardware. But, hey, thanks to the magic of **dual-booting**, you can have your **rebel OS** and your favorite games, too. On the following pages, we tour **five OSes** that enjoy **vehement** fan support. The **ultimate** rebel OS, **Linux**, is on this month's **bootDisc**. Install it for righteous rounds of dual-boot madness.

Remember, the man can **steal** your pocketbook, but he can't **claim** your **soul**.

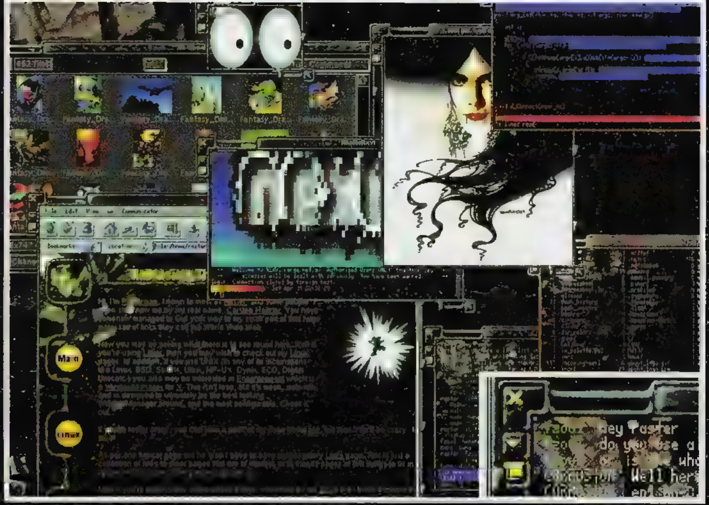
— Chris "The Dunphinator" Dunphy



Photography by Mark Madeo
Tattoos by Lad

Linux

TRY IT ON THE DISC



Unix mixes a powerful text-based shell with a graphical interface called X-Windows. You can completely change the look and features of your desktop by changing the window manager program. In this case, each window's Giger-esque button set is mounted on the side. Funky!

Unix sprang from AT&T Bell Labs as a platform for operating system and language research in the early 1970s, and quickly became a mainstay of university computer science departments worldwide. From the get-go, Unix source code was freely distributed for academic use. With so many brilliant researchers playing with its guts, Unix branched off into different flavors. Truly free flavors of Unix (which aren't tied to AT&T's copyrighted source code) include OpenBSD, FreeBSD, and NetBSD. But Unix barely made its way off of corporate servers and workstations until a Dutch student named Linus Torvalds built Linux, a free Unix kernel optimized for cheap x86 hardware.

More than a million Linux users have since extended Torvalds' work in what may be one of the greatest collaborative programming projects of all time. Linux is now a mature, stable operating system that rivals commercial Unix flavors in features and performance—and blows them away when it comes to price.

Why Linux? Linux is a dream system for people who want total control of their computers. Since the source code is freely distributed, you can join the net community in killing bugs and adding features, or simply tweak away to your personal tastes. Since so many code hackers like working with Linux, the OS has better support for hardware than most alternative systems. Likewise, a growing number of software applications are available, and most are free. Linux-native highlights include the *Photoshop*-like *GIMP*, the ultimate programmer's editor, *X-Emacs*, the high-performance yet free *Apache* web server, Netscape *Communicator*, and even *Quake*.

Linux provides a powerful text-based shell interface that makes DOS look primitive, as well as a graphical user interface called X Windows that can be extended with different window managers to give your desktop a custom look and feel. And since Unix has always been a multi-user system, you can log on to your Linux machine from anywhere on the net. In fact, dozens of users can simultaneously use the average Linux box.

If you want to run Windows applications under Linux, you're not totally out of luck. A project called WINE (WINdows Emulator; **www.linpro.no/wine**) is underway to port the win32 APIs to Linux. Only a smattering of applications currently run under WINE, but the number grows every day. And since the CPU underneath is still Intel, no CPU-level emulation is necessary, allowing programs under WINE to run full-speed.

Why Not? Life with Linux isn't for the faint-hearted: It provides too much power and flexibility for many new users to grasp. In most other OSes, there's usually just one way to do any particular function. Under Linux, there may be 50 different ways. On the bright side, if you take the time and effort, you can configure your Linux setup to fit like a glove. In fact, many Linux fans spend more time tweaking their OS setup than actually using it.

The Upshot If you think an OS is more than just a means to an end, Unix is for you. Nothing else lets you dig into the heart of your machine, and take total control. And though many flavors of Unix are available, none are being enhanced as quickly—and by as large a number of rabid fanatics—as Linux. The only difficult choice is choosing a Linux version that fits your needs. While most other alternative OSes are stuck on the fringe, Linux is currently on fire, carving a huge niche for itself as a mainstay of the Internet. Certainly, both Netscape and Microsoft hate to see some of the biggest web sites running the free Apache web server on top of a free OS. Linux proves that the power of the proletariat is not to be scoffed at.

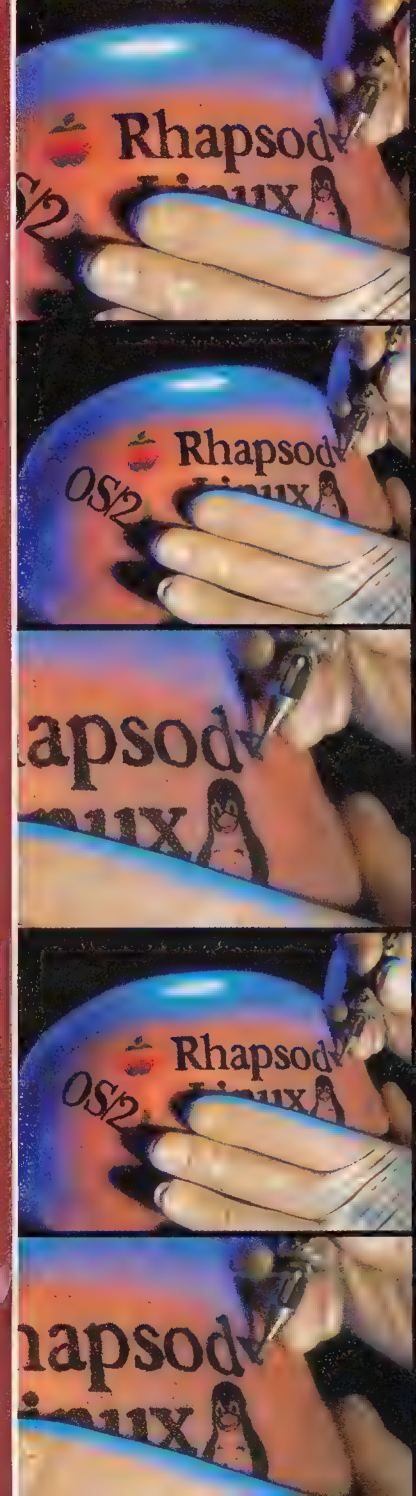
Free Gnus is Good Gnus

Don't be surprised that industrial-strength world-class operating systems are available for free: Half the Unix world is dominated by hackers and researchers who are more interested in building something "neat" than in turning profits. The other half caters to professionals. Unix software thus tends to be either free, or more expensive than any individual could possibly afford.

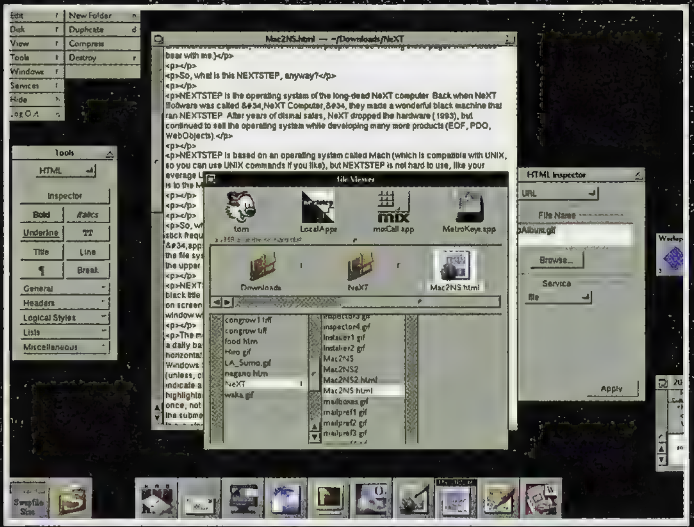
*Free software is the legacy of the Free Software Foundation—**www.fsf.org**—which was organized by legendary programmer Richard Stallman. The FSF Gnu project, which distributes a free replacement for commercial Unix versions, has provided the philosophical base upon which every other free OS has been built.*

The FSF advocates that all software should be free—not just free to use, but also free to modify and improve. If you find a bug or want a new feature, simply grab the source code and make the modification yourself. With free software, there's no need to wait two years for a new version of an app. Likewise, because every user is also a potential developer, free software often has more features and better performance than commercial equivalents. Free software also tends to suffer from poor documentation and inconsistent user interfaces—hence the downside of collaborative development.

Availability Now
Price Free
Developer Many
(and you can be one, too)
URL www.linux.org; www.debian.org;
www.caldera.com; www.redhat.com



Rhapsody



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bear with me.)</p>
<p></p>
<p>So, what is this NEXTSTEP, anyway?</p>
<p></p>
<p>NEXTSTEP is the operating system of the long-dead NeXT computer. Back when NeXT
Software was called &#34;NeXT Computer,&#34; they made a wonderful black machine that
ran NEXTSTEP. After years of dismal sales, NeXT dropped the hardware (1993), but
continued to sell the operating system while developing many more products (EOF, PDO,
WebObjects).</p>
<p></p>
<p>NEXTSTEP is based on an operating system called Mach (which is compatible with UNIX,
so you can use UNIX commands if you like), but NEXTSTEP is not hard to use, like your
```

The developer's release of Rhapsody will ship with the powerful NeXT user interface, shown here. Currently running apps are represented by icon buttons at the bottom. The final Rhapsody will dumb down the UI, and simplify things to make it more Macintosh-like.

The story of the Rhapsody OS is the story of Steve Jobs, the visionary founder of Apple, NeXT, and Pixar. In case you haven't been following the soap opera, here goes: Jobs invents the Macintosh. Jobs leaves Apple, starts up a company called NeXT, and creates Motorola 68K-based NeXT computers and the NeXTstep operating system. NeXT fails as a hardware company, so it ports NeXTstep to run on PCs. NeXT fails as an OS company, and creates OpenStep, a NeXTstep-inspired application framework for Windows NT. Apple pays Jobs $400 million to co-opt the NeXT OS and all of its intellectual assets to save the floundering MacOS. And thus we have Rhapsody, the reincarnation of NeXTstep crossed with the surviving remnants of the MacOS. It's coming next year, and is designed to run on both PowerPC and Intel hardware.

Why Rhapsody? Rhapsody will retain NeXTstep's powerful coupling of BSD Unix on top of a preemptive multitasking and protected Mach kernel. All this power is hidden by a flexible user interface that makes knowing Unix unnecessary. Says Rhapsody Senior Marketing Manager Ricardo Gonzalez: "Rhapsody takes the mature foundation and object-oriented framework from NeXT, and combines it with technologies from Apple like QuickTime, QuickTime VR, AppleScript, and Color Management." Java support will also be central to Rhapsody's feature set.

Both Intel and Macintosh versions of Rhapsody will be available when the OS premieres in January 1998. Software will need to be recompiled, but as Gonzalez says, "The only thing that Rhapsody for PC doesn't have is the blue box that allows MacOS compatibility." Thanks to its object-oriented nature and an amazing suite of NeXT developer tools, Rhapsody will be a programmer's dream. A typical NeXTstep demo involves writing a simple word processor from scratch in just four minutes. Programming Rhapsody apps should be just as easy.

According to Gonzalez, the user interface for Rhapsody is far from final. "It will have a very strong Mac look and feel," he says. "The user interface will change a lot from the developer release, as we move from NeXT to a more Mac-like product."

If the Mac interface is not to your liking, a fully extensible Finder facilitates third-party tweaking.

Why Not? Given Apple's dubious ability to manage itself, Rhapsody may be crippled—or, good lord, even killed—before it ever makes it out the door. And even if Rhapsody proves to be cool, applications for it will also run under Windows, thanks to the portable APIs. Gonzalez himself says, "A customer who is happy using the Windows system will continue to keep using the Windows system. I don't think Rhapsody will move Windows users from their platform."

The Upshot Does Rhapsody have a chance of competing against the Microsoft onslaught? Let's return to the chronicles of Steve Jobs for an answer: Since taking over the sinking Apple ship, Jobs has sold all but one share of his stock. He has proceeded to screw over Macintosh clone makers, nearly killing the hope of technologically competitive PowerPC-based computers. And he has called upon arch-rival Bill Gates to save the company. With Microsoft now pulling strings behind the scenes, it's hard to imagine Rhapsody coming out as the NT killer that it has the potential to be. Perhaps the best we can hope for is a scenario in which the MacOS becomes the Microsoft-endorsed "Windows for grade schools." Multimedia edutainment, anyone?

Keeping Tempo with the MacOS

Sure, it doesn't run on Intel hardware, but the MacOS has a hardcore following that can't be ignored. Unfortunately, Apple's mainstay operating system has been stuck in technological stasis for years. At its heart is a cooperative multitasking core that's no more advanced then the one in Windows 3.1. The much-heralded evolution of the MacOS into a modern incarnation (code-named Copeland) was killed last year after falling years behind schedule. This forced Apple to buy NeXT so it could deliver a modern, preemptive multitasking, protected operating system.

But wait! In order to provide Macintosh owners with something to play with until Rhapsody arrives, Apple released MacOS 8 (formerly code-named Tempo) in July. MacOS 8 provides many of the superficial enhancements of Copeland, but few of the core enhancements that would really help the OS turn a corner. Mac users are now thrilled to be able to copy multiple files simultaneously. So who's impressed?

Unless you have a lot of work to do in desktop publishing, there's no reason to consider the current MacOS as an alternative to Windows 95. But for the sake of the industry as a whole, let's hope Apple makes a comeback.

Availability ***Openstep for NT, now; Rhapsody Developer's Release, Fall 1997; Rhapsody Premiere Release, January 1998; Rhapsody Unified Release, Summer 1998.***

Price ***TBA***

Developer ***Apple/NeXT***

URL ***www.macos.apple.com***

BeOS

The BeOS is something new. The basic premise is that if you start from scratch, and don't worry about backward compatibility, you can build a much more powerful operating system than one that has evolved as a series of band-aids, patches, and extensions. BeOS supporters say Windows is gross and bloated, the MacOS is doomed by its past, and Unix is a big hairy mess. The BeOS, on the other hand, is fast, small, powerful, modern, simple and beautiful.

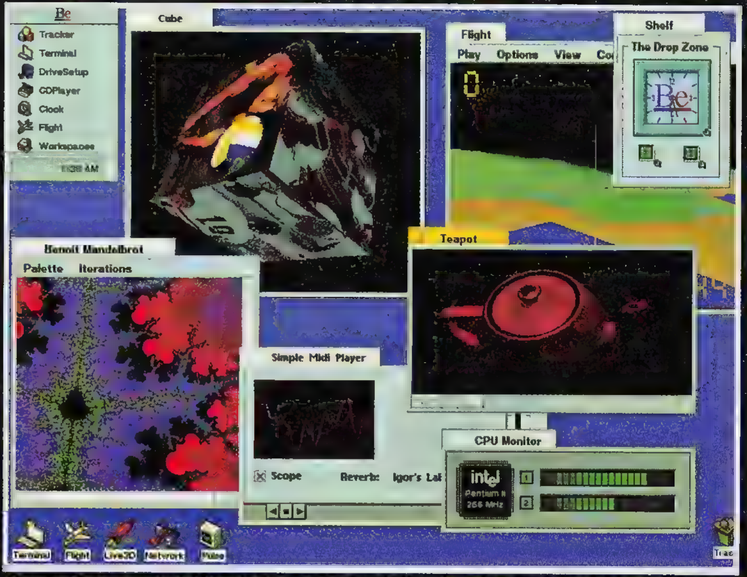
The BeOS was inspired by the power of Unix, the ease of Macintosh, and the powerful media features of the Amiga. The Be people sought to take the best elements of all these systems, avoid their mistakes, and build an entirely new and modern operating system from the ground up.

When first released in 1995, the BeOS ran only on custom-built Be Boxes, but Be soon left the hardware business, and ported its OS to run on Power Macs. Most recently, with the help of Intel, Be has ported the BeOS to run on standard PCs. According to Be, beginning with the first "official" release of the operating system in January, both the Intel and PowerPC versions will be identical, and will only require a software recompile to port applications between them.

Why Be? The BeOS keeps the powerful command shells of Unix, yet doesn't skimp in GUI functionality. A Java virtual machine comes bundled with the BeOS, and Internet support has been central since Day One.

The BeOS was designed from the giddy-up with multi-processing in mind, and scales well to take advantage of up to eight parallel CPUs. Even on a single processor machine, the BeOS is more intrinsically multi-threaded than other OSes, and thus feels more responsive. Every open window is drawn by a separate thread apart from the main program, so the OS instantly responds to your actions on-screen. The machine never lets you feel like you're waiting.

The shiny new Be APIs are logically designed, and make the BeOS a joy to program (although advanced functionality such as hardware 3D acceleration is still in its infancy). Speaking of 3D, BeOS supports both OpenGL and a native object-oriented 3D API, easing the challenge of porting over apps. Porting is also made easier by a Posix library that makes it easy to move most text-based Unix applications to BeOS.



Be recently demonstrated the BeOS running on a dual Pentium II system at 266MHz, and it was fast! Great media-handling capabilities are demonstrated by videos on the spinning cube.

Why Not? The BeOS may be a modern design, but it's still immature. The first public "preview" of the BeOS has just been released, and a final version is still months away. And though the BeOS may have a rock-solid foundation, it hasn't been around long enough to accumulate all the niceties that other operating systems take for granted. Though a lot of major software developers are taking a hard look at the BeOS, only Netscape has come forward with a commitment to support the fledgling platform, and is currently only promising to port server software. Smaller third parties may rise to the challenge, but it's going to be a while before many of these projects bear fruit. Sadly, an OS can't survive without vendor support.

The Upshot The BeOS is a refreshing change of pace in a world crowded with old ideas. It's multi-threaded functionality gives it the near real-time performance that's necessary for working with streaming media such as live audio and video. The BeOS faces an uphill battle, but Be has kept its aspirations realistic, and has been inching cautiously forward. With the release of the BeOS on Intel in January, things should begin advancing at an even faster rate.

Many small third parties are rising to the challenge of creating applications for the new architecture, and from the early demos we've seen, amazing things are headed your way. The BeatWare BeBasics productivity suite sets a new benchmark in word processor slickness, and rö design's *Shöwboat* does amazing things that should make Adobe *Premiere* sweat. Even Marc Andreessen has been quoted saying the BeOS will become the premiere platform for running Netscape's FastTrack server.

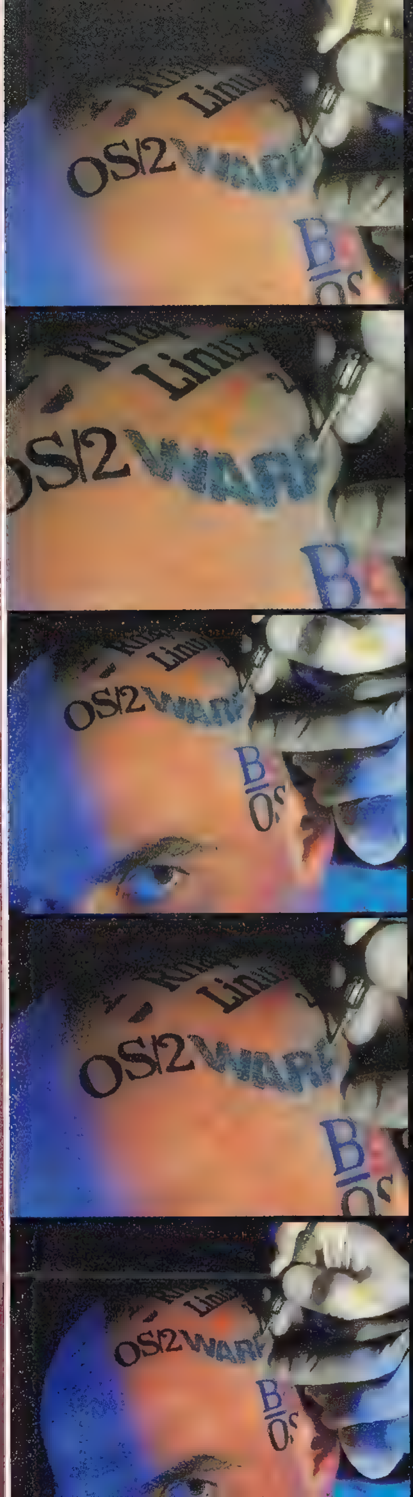
The BeOS is a young child with a promising future. If it survives its first few years, it may be hard to stop.

Intel Involved

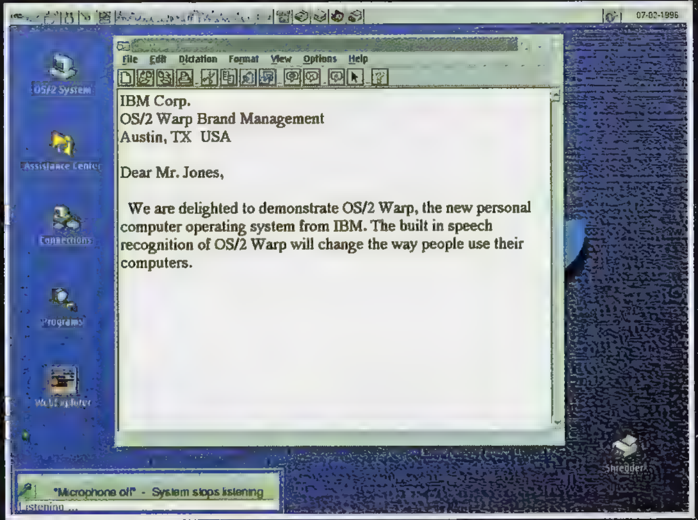
Be had always intended the BeOS to be portable to different architectures—the company just never intended to do it so soon. But when Intel came forward with the idea of doing a Pentium port, and offered to provide the engineers and resources to do so, Be jumped at the offer.

The end result of this collaboration is BeOS on Intel, shown for the first time at the Be Developer's Conference in August. Intel likes the idea of having more than one viable OS running on its chips, and is supporting Be as a hedge against Microsoft. Be is thrilled to be on Intel: The port helps distance Be from the sinking Apple ship, and opens up an avenue for millions of potential customers.

Availability: *PowerPC Preview Release, now; Release 1.0 for Intel and PowerPC, January 1998.*
Price: *TBA*
Developer: *Be Inc.*
URL: *www.be.com*



OS/2 Warp



IBM Corp.
OS/2 Warp Brand Management
Austin, TX USA

Dear Mr. Jones,

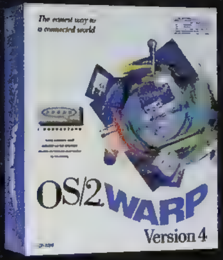
We are delighted to demonstrate OS/2 Warp, the new personal computer operating system from IBM. The built in speech recognition of OS/2 Warp will change the way people use their computers.

"Microphone off" - System stops listening

The letter above was created with voice dictation. Notice the the speaker's voice wave form at the top of the screen. The voice recognition capabilities of OS/2 are unmatched. If you like talking to your computer, or just dislike typing, this may be the OS for you.

OS/2 is the OS that almost was. At its launch, both IBM and Microsoft were behind it, jointly promoting it as the operating system of the future. OS/2 was destined to rule the high-end roost, while Windows would be the platform for family computers and lower-end systems. Thanks to a technology sharing agreement, IBM's OS/2 development team had access to the Windows APIs and source code, allowing OS/2's 32-bit native pre-emptive multitasking heart to run Windows applications, DOS applications, and OS/2 native applications together at one time—all with a remarkable immunity to crashes. Success seemed inevitable. Until Microsoft decided to screw IBM.

As IBM began a thrust to push OS/2 into homes, Microsoft launched Windows NT to challenge OS/2 in high-end territory. The two former allies were now at each other's throats. Microsoft even went so far as to delay finalizing some of the Windows 95 APIs until after the technology sharing agreement had expired, just to prevent OS/2 from being Win95 compatible. As Win95 gained ground, OS/2's advantages crumbled. It wasn't long before IBM was in full retreat, turning away from the mainstream consumer market.



Why Warp? The latest release of OS/2 (Warp 4) offers many compelling features. OS/2 has always boasted a full-fledged 32-bit design with a protected and preemptive multitasking kernel. Its operating environment is designed with object-oriented principals, and the whole system is intelligently designed with a consistent feel. Warp 4 adds integrated voice navigation and dictation features, and Java 1.1 is natively supported.

The Internet is central to IBM's OS/2 strategy. IBM Director for World Wide Technical Projects John Soyring says, "We decided to quit following the Windows APIs two years ago to focus on the Internet. We had the legal right to clone Microsoft APIs, but what would that mean to OS/2's long-term market share? Java is core to our future. We are transforming OS/2 to become a premiere network operating system."

Under pressure from IBM, Netscape recently began distributing its *Navigator* browser as a standalone app separate from the *Communicator* groupware suite. IBM wants to provide *Navigator* as the default browser for OS/2, but doesn't like the idea of *Communicator* functionality competing with its own Lotus *Notes*. *Navigator 4.0* for OS/2 should be out later this fall, further solidifying OS/2's net-centric strategy.

Don't count on an *Internet Explorer* port or Windows *Solitaire* any time soon.

Why Not? Even Soyring says, "If you want to run primarily Win32 apps, OS/2 isn't for you." And while OS/2 does support a software implementation of OpenGL, if 3D is your thing, Soyring says you won't enjoy support for high-powered hardware. "Just a few IBM 3D accelerators," he says. "We don't target that market." Enhanced Windows 95 compatibility isn't in the cards either. IBM has developed a technology called Open32 that allows easy porting of Windows NT apps, but Soyring says, "No big name vendors are taking advantage of it."

The Upshot As a Java platform and for its dictation features, OS/2 is hard to beat. But don't count on much consumer support from IBM; it has bigger fish to fry. "For the next several years, we will focus on the large to medium enterprise market, and the embedded OS market. For example, 90% of the world's ATMs run OS/2," Soyring says. However, if dual-booting is your thing, OS/2 may just pay for itself. As Soyring says, "It's worth buying OS/2 just get the boot manager functions, which are the best in the world."

A better DOS than DOS?

An OS/2 media blitz hit the world throughout 1995. You could hardly blink without hearing IBM trumpeting the claim that OS/2 was better at running DOS and Windows applications than DOS and Windows themselves. In many ways, the claim was true. When it came to running several Windows programs at once, the modern multi-tasking features of OS/2 could run circles around Windows 3.1, and DOS apps were a piece of cake. OS/2's object-oriented, ultra-configurable desktop could even be made to look like Windows, or just about any other look you could imagine. It seemed for a while that OS/2 might send Windows packing.

So what happened?

Well, OS/2 was so good at running Windows 3.1 apps, IBM had a hard time justifying to developers the expense of doing OS/2 native versions. Then Windows 95 came out, and without full win32 support, OS/2 was left incompatible with the entire new wave of Windows apps. Battered by Windows 95, IBM was soon beating a hasty retreat out of the consumer market.

Availability *Now*
Price *Warp 4, $249; Warp 4 Server, $629*
Developer *IBM*
URL *www.software.ibm.com*

Open DOS

Believe it or not, DOS might make a comeback.

In 1996, Caldera, a small startup, acquired the rights to Novell's DOS 7, which had formerly been known as Digital Research's DR-DOS—the most successful of all MS-DOS clones. Caldera also acquired the rights to press on with a lawsuit against Microsoft that alleges anti-competitive practices that kept DR-DOS off of new machines. If Caldera wins the lawsuit, the purchase of DR-DOS will more than pay for itself. In the meantime, the company has re-dubbed DR-DOS as OpenDOS, and has big plans to give it away for free.

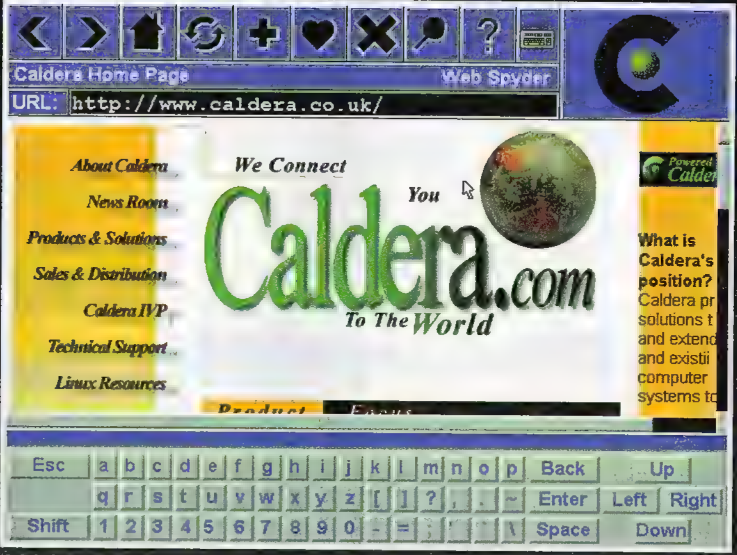
Why OpenDOS? OpenDOS is fully compatible with the last release of MS-DOS, 6.2. You can even run Windows 3.1 on top of it. Because of this, there are thousands of OpenDOS compatible applications available, many dirt cheap if you can even still find them. Many of the best games available today are still DOS-only, or are offered with DOS versions.

OpenDOS goes light years beyond where DOS ever dared to travel. If you have a 386 or better, OpenDOS provides true pre-emptive multitasking capability, allowing you to run many DOS programs simultaneously. OpenDOS also includes built-in Stac disk-doubling technology, online documentation, enhanced and extended DOS commands, networking support, PPP, the CalderaView GUI, and a full featured HTML 3.0-compliant web browser, *WebSpyder*. This browser is an impressive piece of work, allowing you to view web pages featuring BMP, GIF, JPEG, PNG, MPEG, and WAV files. FTP transfers and POP mail reading are supported as well. All this with a polished GUI that makes quick web trips easy.

OpenDOS earns its "open" name because Caldera is committed to publishing all source code for free, non-commercial use. If you've always wanted to change the way dir prints listings, or just want to know how DOS works, now is your chance to get at the guts.

Why Not? It's DOS for god's sake. Some things are better left dead.

The Upshot Dust off your old 286—with OpenDOS around, there just may be some use for it yet. As much as Intel and Microsoft might hate the idea of old machines rising from the junk heap, all those obsolete dinosaurs of yesterday can become the "network computers" of tomorrow. OpenDOS can bring your doorstop back to life, making it into a great web terminal for the kitchen, or DOS game box for the garage. It may not become your day-to-day OS, but OpenDOS can surely find some interesting place in your life. And you can't beat the price.


Caldera Home Page
Web Spyder
URL: http://www.caldera.co.uk/
About Caldera
News Room
Products & Solutions
Sales & Distribution
Caldera IVP
Technical Support
Linux Resources
We Connect You To The World
Caldera.com
Powered Calder
What is Caldera's position?
Caldera pr
solutions t
and extend
and existi
computer
systems to
Esc a b c d e f g h i j k l m n o p Back Up
q r s t u v w x y z [ ] ? , . ~ Enter Left Right
Shift 1 2 3 4 5 6 7 8 9 0 - = ; ' ` \ Space Down

A full-featured graphical web browser under DOS? Will wonders never cease?

Availability *Now*
Price *Free for non-commercial use; CD and commercial use license, $30*
Developer *Caldera*
URL *www.caldera.com*

The Future: Can any rebel OS challenge the Redmond War Machine

The Dream *Java becomes a viable platform, and more and more software is written to run on any OS regardless of CPU. New blazing fast and inexpensive processors become widespread as the x86 architecture is left in the dust. New OSes emerge that pioneer new paradigms of man-machine interaction. Microsoft is just one of many players in a crowded OS market, and Intel is just one of many viable CPU makers. Innovative and inexpensive alternative computers such as the Amiga and Pios 1 rise from obscurity. Competition delivers amazing advances in technology, leading to world peace and an end to hunger.*

The Nightmare *Rhapsody evaporates as Apple moves into a new era of cooperation with Microsoft. BeOS is sabotaged by Intel in deference to Microsoft. DOS remains dead. IBM continues to retreat from OS/2 as a general-purpose OS. Commercial Unix continues to lose ground to NT, while free Unix advocates are shunned as bunch of Commie pinkos. Microsoft manages to slip a mere 1% of platform-dependant impurity into 100% Pure Java, destroying the dream of platform independence. All other OSes are dead or dying, and Windows 98 and NT 5.0 reign supreme.*

The bootPrediction *Microsoft and Intel will both continue to dominate the market, but something will inevitably legitimatize alternatives. Amazing advances in OS technology will be developed everywhere, from Lucent labs to student dorms. Operating systems of tomorrow will make Windows feel like DOS does today. And there will always be enough freaks out there using and developing alternative OSes to make living on the fringe fun and exciting.*

12-STEP

DEALING WITH YOUR **PC OBSESSION** DAY-TO-DAY BY BREAKING IT DOWN INTO 12 **EASY** STEPS

Installing Unix

TRY IT ON THE DISC

So, you want to try a real operating system? You want to boot up an OS whose brethren have been multi-processing for close to 20 years now? How about a free operating system that comes with source code so you can peek under the hood and rebuild that source into a custom-built kernel for optimal performance on your hardware? This isn't a dream, it's the world of freely available software: potentially millions of developers, no marketing hype, no Bill to pay.

Well, here's your chance to rebel. What follows are 12 whirlwind steps to guide you though the custom installation of Linux using the Debian GNU/Linux distribution on this month's bootDisc. Go ahead, intimidate your friends and impress your enemies. Run Unix on your PC!

— Keith Beattie

1

Read More About It

Installing Unix is no small task, so take advantage of all the resources available. This 12-Step is a starting point, but you'll want to look at (or even print out) a few key documents that go into more detail than can be covered here. Fortunately they're all on this month's *bootDisc* in \Debian\Docs. The first doc is the *Linux Hardware Compatibility HOWTO* (HOWTO.TXT), which tells you if your particular hardware is supported. The second, *Installing Debian GNU/Linux 1.3* (install.html), answers many installation questions. Next is *Dselect Document For Beginners* (dselect.html). This is a Debian/GNU Linux tutorial. The last is the *Debian FAQ* (debian-faq.txt). For more information on Debian, the humble guardians of free software, and the ever-popular Debian mailing list, go to **www.debian.org.** It's a great source for all things Linux.

2

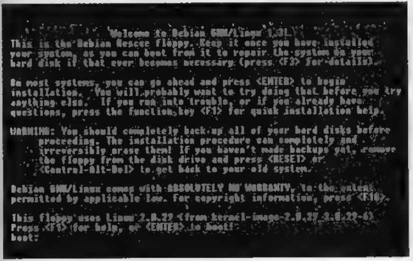
Divide and Conquer

Now, let's get to work. First, make room on your hard disk for the new OS by creating an empty partition. It could be as little as 40MB, but you'll need at least 300MB for a full system install. There are really two ways to do this: the drastic way and the scary way. Drastic: fire up fdisk and repartition away... erasing all the data on the drive. The less drastic method is to re-partition your disk on the fly using a tool such as Partition Magic or the freeware equivalent, *fips*, which comes with Debian (it's in \Debian\Tools). Be warned: If you don't back-up you're asking for trouble—but you already knew that, right? Two things to keep in mind here: *fips* doesn't deal with FAT32 file systems, and DOS/95/NT doesn't take kindly to booting from other partitions. If you want to dual boot after the install, place the DOS partition first on the disk, and make sure it's FAT16.

3

Brave New World

Now you should have an empty disk partition waiting for Unix. Pop the *bootDisc* into the machine and use the rawrite tool (in \Debian\Tools) to create a rescue disk. The DOS command line **rawrite2 -f resc1440.bin -d a:** will turn a 1.44MB floppy disk into a bootable Unix disk. When you're ready, reboot with that disk to begin the installation process.



```
                    Welcome to Debian GNU/Linux 1.3!
This is the Debian Rescue floppy. Keep it once you have installed
your system, as you can boot from it to repair the system on your
hard disk if that ever becomes necessary (press <F3> for details).

On most systems, you can go ahead and press <ENTER> to begin
installation. You will probably want to try doing that before you try
anything else. If you run into trouble, or if you already have
questions, press the function key <F1> for quick installation help.

WARNING: You should completely back up all of your hard disks before
     proceeding. The installation procedure can completely and
     irreversibly erase them! If you haven't made backups yet, remove
     the floppy from the disk drive and press <RESET> or
     <Control-Alt-Del> to get back to your old system.

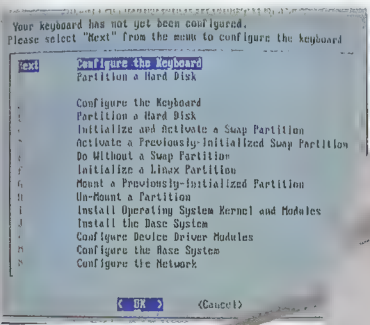
Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law. For copyright information, press <F10>.

This floppy uses Linux 2.0.29 (from kernel-image-2.0.29 2.0.29-6)
Press <F1> for help, or <ENTER> to boot!
boot:
```

4

Install This Baby

Debian's Install program is very straightforward and intelligent. Each step you need to take is listed in the program's menu of options. After each step, the install program evaluates the state of your system and suggests the next step. From here on out, pressing Left-Alt-F2 switches you over to a virtual console where you can start a Unix shell and peak at the state of your machine as you proceed along with the installation program. Use Left-Alt-F1 to get back.



```
Your keyboard has not yet been configured.
Please select "Next" from the menu to configure the keyboard

 Next        Configure the Keyboard
             Partition a Hard Disk

             Configure the Keyboard
             Partition a Hard Disk
             Initialize and Activate a Swap Partition
             Activate a Previously-Initialized Swap Partition
             Do Without a Swap Partition
             Initialize a Linux Partition
             Mount a Previously-Initialized Partition
             Un-Mount a Partition
             Install Operating System Kernel and Modules
             Install the Base System
             Configure Device Driver Modules
             Configure the Base System
             Configure the Network

                  < OK >        <Cancel>
```

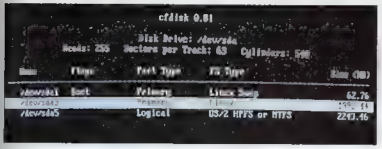
The Unix file system: A single tree

Unix doesn't assign drive letters; the entire file system appears as a single hierarchy sprouted from a root directory represented by a "/" character. Directory separators are forward slashes (the direction God intended directory separators to lean.) Each file system partition is mounted onto that hierarchy as a subdirectory and all your disks and partitions appear as a single tree—no drive letters (e.g., C: and D:) as there are in the DOS/NT world.

5

Set Up House

This is where you create the Unix partitions that exist *within* the partition you created in step 2. Pay careful attention because there are a few things new to even the more experienced DOS guru. Use the cfdisk command to delete the partition you had reserved, and then create in that space two new partitions: one of type Native Linux (for /), and one of type Swap (for virtual memory). After partitioning, go though the steps to initialize and activate (aka format) the partitions you just created. You should now have the partitions mounted in the file system. (see "The Unix file system: a single tree" on the preceding page).



```
                         cfdisk 0.8l

                     Disk Drive: /dev/sda
        Heads: 255   Sectors per Track: 63   Cylinders: [illegible]

Name        Flags     Part Type     FS Type               Size (MB)
-------------------------------------------------------------------
/dev/sda1   Boot      Primary       Linux Swap                62.76
/dev/sda3             Primary       [illegible]         [illegible]
/dev/sda5             Logical       OS/2 HPFS or NTFS       2243.46
```

6

The Kernel Needs to Know

Next, install the operating system kernel and modules. Modules are device drivers installed *into* the kernel. You'll need to know all the intimate details of your machine because plug-n-play isn't going to find all your hardware for you.

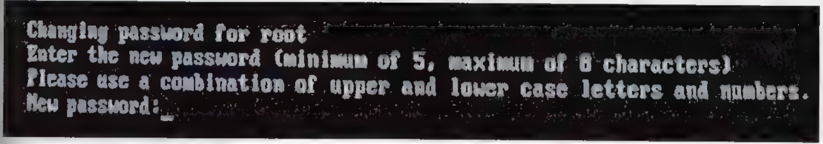
You control what you want loaded into the kernel. In the "Configure Device Driver Modules" section, use the menus to add the appropriate drivers for your needs: mouse, sound card, etc. Give your machine a name in the "Configure the Network" section. If you're connected to a network, set up your other network options while you're there.

7

Countdown to Boot!

Now, you install the base system. This is where components are uncompressed and installed. After supplying your time zone information, you can make the hard disk bootable as well as make a bootable floppy. The instructions are straightforward; just answer them depending on how your system is configured (see "Boot managers"). Next comes the moment of truth: re-booting your new Linux-based system on it's own.

When the system comes up, you'll be prompted to enter a password for *root*, the administrator's account. The *root* account should only be used when doing system administration tasks (such as installing the operating system). A user account is also created for day-to-day use.



```
Changing password for root
Enter the new password (minimum of 5, maximum of 8 characters)
Please use a combination of upper and lower case letters and numbers.
New password:_
```

Boot Managers

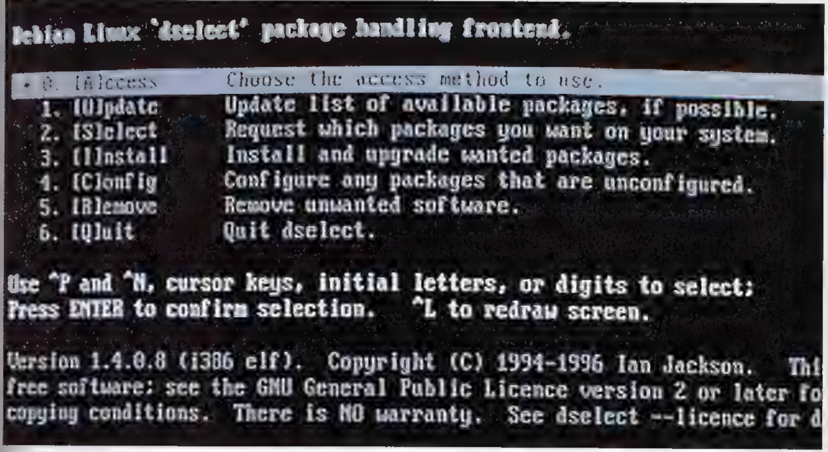
There are really only two freeware answers to the dual-boot question with Linux: LILO and loadlin. LILO is the low-level approach. It writes a new master boot record (MBR) that knows how to boot DOS/Windows or Linux after prompting you for the choice. All the details can be found in the LILO man page (use the command: **man lilo***) and in the LILO Users Guide, which is installed with the LILO package. The other option, which is easier to use but not as slick, is loadlin. This is a DOS executable that will launch your Linux kernel from DOS and hence boot up Linux. (This actually is kind of appealing: Linux launches by completely overwriting the currently running DOS!)*

In the commercial realm, nothing beats System Commander*'s powerful boot managing features.*

8

Pick a Package, Any Package.

The Debian distribution divides the Linux system (and the hundreds of applications available for Linux) into packages. Each package knows how to install itself onto your system and knows what other packages it depends upon, and which it conflicts with. This allows a user, or program, to easily install and maintain a system without having to manually track conflicting programs. The dselect program is built to aid in the installation and maintenance of the Debian packages. It's not perfect—its interface requires some getting used to—but it saves a tremendous amount of work.



```
Debian Linux `dselect' package handling frontend.

 * 0. [A]ccess     Choose the access method to use.
   1. [U]pdate     Update list of available packages, if possible.
   2. [S]elect     Request which packages you want on your system.
   3. [I]nstall    Install and upgrade wanted packages.
   4. [C]onfig     Configure any packages that are unconfigured.
   5. [R]emove     Remove unwanted software.
   6. [Q]uit       Quit dselect.

Use ^P and ^N, cursor keys, initial letters, or digits to select;
Press ENTER to confirm selection.   ^L to redraw screen.

Version 1.4.0.8 (i386 elf).  Copyright (C) 1994-1996 Ian Jackson.   Thi
free software; see the GNU General Public Licence version 2 or later fo
copying conditions.  There is NO warranty.  See dselect --licence for d
```

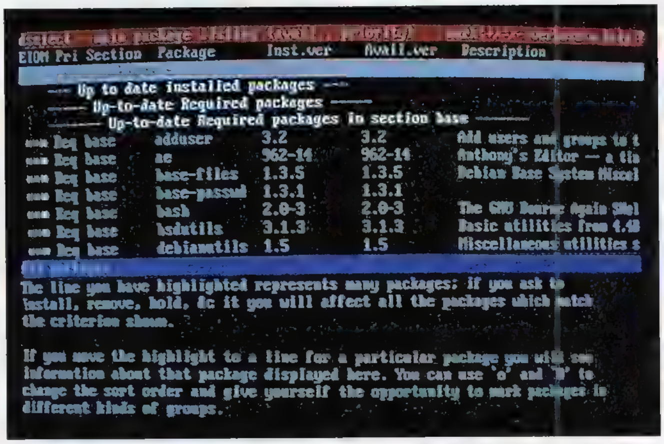
Logitech

9

Dselect: A Quick Run-through

Always step through dselect's menus sequentially. In the "Access" section, select the CD-ROM and use the default choice given for the CD-ROM mount point. For the distribution's top level, enter "none". Then enter "/Debian" when prompted for the main distribution area. Finally, just hit return to skip over the other prompts. Run through the "Update" section to sync dselect with the *bootDisc*. In the "Select" section (after the intro help screen), just hit enter on the "All Packages" line. In the interest of keeping things simple, this will install a default selection of packages. Back at the main menu, hit Install, and sit back and relax. Dselect now cracks open each package in the default installation and loads them. Some will fail, and some will ask you questions—accept the defaults for most of these. This may take a while, depending on the speed of your machine. Most settings can be re-configured later and the packages will usually tell you how, so don't worry if you make a mistake.

Now run Install again. That's right, install the packages again. As a matter of fact, do it at least three times. This is normal operating procedure for dselect. Repeating the installation of packages will work through all the dependency relationships between packages. Some packages fail their first installation because other packages they depend on had not been installed, and packages *deeper* in the dependency tree were not found. After the first pass the *base* packages will be installed, and a second (or third) pass will pick up all the rest. So when are you done? Look at the output during the installation—if nothing is installing, then you're done.



```
EIOM Pri Section  Package      Inst.ver    Avail.ver   Description

  --- Up to date installed packages ---
   ---- Up-to-date Required packages ----
    ----- Up-to-date Required packages in section base -----
 *** Req base     adduser      3.2         3.2         Add users and groups to t
 *** Req base     ae           962-14      962-14      Anthony's Editor -- a tin
 *** Req base     base-files   1.3.5       1.3.5       Debian Base System Miscel
 *** Req base     base-passwd  1.3.1       1.3.1
 *** Req base     bash         2.0-3       2.0-3       The GNU Bourne Again Shel
 *** Req base     bsdutils     3.1.3       3.1.3       Basic utilities from 4.4B
 *** Req base     debianutils  1.5         1.5         Miscellaneous utilities s

The line you have highlighted represents many packages; if you ask to
install, remove, hold, &c it you will affect all the packages which match
the criterion shown.

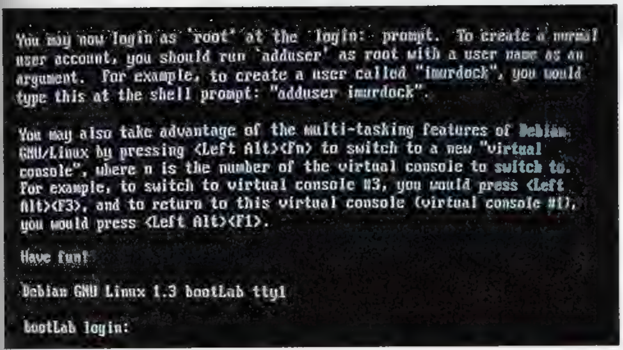
If you move the highlight to a line for a particular package you will see
information about that package displayed here. You can use `o' and `O' to
change the sort order and give yourself the opportunity to mark packages in
different kinds of groups.
```

10

What Now?

If you've got this far, congratulate yourself. You are now the proud administrator of a new Linux system. There's plenty to learn as both an administrator and a user—a good starting point for learning all this is **www.geek-girl.com/unix.html**.

Here are some of the basic things you'll need to do: To shut the machine down, use the command **shutdown –h now**. Remember though, Unix is intended to be an operating system that runs 24 hours a day. Certain house-cleaning tasks are, by default, set to run in the middle of the night. Also, you'll probably want to be able to mount your DOS partition and/or CD-ROM. This can be done by executing, as root, the command **mount –t iso9660 /dev/device /cdrom**. Where *device* is replaced by a CD-ROM driver (Probably hdc for an IDE or scd for a SCSI). To mount your DOS partition, first create a directory to be used as its mount point: **mkdir /dos**. Now mount the drive there: **mount –t msdos /dev/device /dos**. (Again the *device* is probably hda for an IDE drive or scd for a SCSI).



```
You may now login as `root' at the `login:' prompt.  To create a normal
user account, you should run `adduser' as root with a user name as an
argument.  For example, to create a user called "imurdock", you would
type this at the shell prompt: "adduser imurdock".

You may also take advantage of the multi-tasking features of Debian
GNU/Linux by pressing <Left Alt><Fn> to switch to a new "virtual
console", where n is the number of the virtual console to switch to.
For example, to switch to virtual console #3, you would press <Left
Alt><F3>, and to return to this virtual console (virtual console #1),
you would press <Left Alt><F1>.

Have fun!

Debian GNU Linux 1.3 bootLab tty1

bootLab login:
```

11

Show Me the Software!

We recommend installing two packages not in the default installation: *ppp* and *X11*. The *ppp* package installs the point-to-point protocol for connecting to your ISP via modem. The *X11* package is the X-Window system and it's huge. Unfortunately these two packages take a fair amount of configuring to get them to work properly. You start the process by running dselect as root and going through a similar process outlined in Step 9. Since you've manually mounted the CD-ROM, just use the "mounted file system" selection under the Access menu. You'll want "Dselect for beginners" nearby. The first step is to highlight the package you want to install and mark it for installation using the "+" key. After that you'll be sent to another screen which describes the dependencies and/or suggestions. Select everything by pressing enter. When you install the package, you'll be prompted by the package's installation script for specific configuration settings.

12

The Future

Linux, Debian and the free software movement continues to be on the cutting edge of new software development. You can stay caught up via the Internet using the FTP access choice in dselect. So keep your system up to date.

12-STEP CLINIC

IRQS ACTING UP? VIDEO **DRIVERS** GETTING YOU **DOWN**? 3D CARDS HAVE YOU CAUGHT IN A **CONUNDRUM**? BOOT **EDITORS** ANSWER YOUR TOUGHEST **PC QUESTIONS**.

CPU? Voodoo? What to do?

I have enough money for two upgrades, and can't decide which would be best for gaming. I know I want another 16MB of RAM, but deciding between a faster CPU with MMX or a hot 3D accelerator is a total mystery to me. Many new games coming out are 3D accelerator-mandatory, and I want to play them. But I'm afraid the 3D will still be dog slow because I'm not running a wickedly fast CPU. If you had the choice, which would you choose: CPU or 3Dfx? By the way, how much of a 2D dog is my S3 ViRGE 325? Will it be OK with a Monster 3D card as far as 3D performance goes?

Ryan Patterson

Technical editor Chris Dunphy replies: *The ViRGE has always been a good 2D performer. It just lacks any 3D worth mentioning and VESA 2.0 support—two big knocks in our book. But it makes a decent companion to a Voodoo board.*

In our experience, the Rendition V1000 chipset performs the best on slower CPU systems. You can thank its setup engine, which takes some of the load off the CPU. As the CPU gets faster, this advantage matters less, and the Voodoo surges forth to 3D speed supremacy. A P133 is probably the minimum level at which a Voodoo starts to make sense, but the poor floating point on your AMD may add some extra lethargy to your 3D lifestyle.

In your case, I would go for a 3Dfx now, and start shopping for a CPU upgrade later. You should be able to stick it out a few months until you can find a dirt-cheap P200 at blowout sale. Then you'll be set. Don't fret too much about MMX. It's cool, but non-MMX P200s are getting so cheap, the MMX price premium isn't really worth it. You'll get your taste of MMX when you make the jump to a Pentium II next year.

Acer Anguish

I have a P133 Acer Aspire with 256K cache and 80MB EDO RAM. It houses a 4MB ATI All-in-Wonder, and only scored 22 on the MDK PerfTest, and 20 on the Norton System Info benchmark! Is this normal? I know that I only have a P133, but these scores are crap! I'm going to upgrade the processor to a K6-233 soon—will this help out on the scores? Also, I can't seem to figure out how to run the *Quake* test. Since I didn't see the magazine with the 12-Step to the bootMarks, I don't have any directions. Could you help me?

Frank

Technical editor Chris Dunphy replies: *We have yet to find an Acer desktop machine that we're impressed with, though we hear Acer notebooks are decent. Based on the past Acers we've seen, I can only assume that it's your system's fault you're scoring so low. Some BIOS tweaking may help a little, but you may just be out of luck.*

If you upgrade to a K6-233, scores should jump considerably. But since you're scoring so low with a P133, I think the bottleneck must be somewhere else in your system, and a new CPU may not solve it. You should needle Acer tech support for help, and in the future, avoid buying the daily special at Office Depot. A bargain generally isn't in the long run.

To run our Quake *benchmark, copy the bootmark.dem file from the bootMarks directory of the bootDisc into the id1 subdirectory of your* Quake *folder. Now start up* Quake, *change to 640x480, begin playing, hit the tilde (~) to bring up the console, and type "timedemo bootmark". You must be running at least version 1.06 of* Quake, *so you may need to download the update from Id if your version is older. The bootmark.dem file works with both the shareware and full version of* Quake.

Are You My Mommy?

I currently own a Packard Bell 409CDT 75MHz Pentium with 24MB RAM, quad-speed CD-ROM, and 56Kbps modem. I want to upgrade my machine to at least 166MHz, and preferably to 200MHz. I've just finished reading *Boot* 12, and I'm more confused than ever about which motherboard I should purchase. I want a motherboard that will perform all tasks and games efficiently and equally. I also want to avoid an upgrade for several years. Can you help me out?

Larry

Hardware editor Andrew Sanchez replies: *As far as motherboards are concerned, the first thing you'll need to determine is which form-factor your Packard Bell is hosting. Those boxes are notorious for having proprietary LPX form-factor motherboards, which make upgrading a serious female dog. If the innards of your system looks like two boards connected together by a circuit board either in an L or H shape—the infamous "riser" board—then you're hosed.*

If it looks like the computer uses a normal AT form-factor, then you can get into any number of great motherboards from A.I.R., ASUSTek, Intel, Tyan, Tekram, and others. The big differences between them will be in the number of PCI slots (four should be minimum), and which PCI core-logic chipset it features. The current champ is Intel's 430TX.

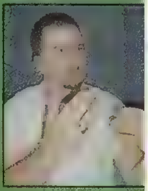
Many issues are at stake when looking for a new board. If you need something you won't outgrow for "several years," your best bet is to invest in a Pentium II motherboard with the AGP-enabled 440LX PCIset, as the majority of processor-intensive software will run faster on a P-II. If you simply must sit pretty in Socket 7/Pentium land, then you can go with an Intel P200 MMX or P233, or even AMD's K6 266MHz or 300Mhz part. Unfortunately, Socket 7 will struggle for survival toward the later half of 1998, despite the infusion of Socket 7/AGP core-logic chipsets. Just remember: A Slot 1/Pentium II motherboard isn't compatible with Socket 7 processors such as the 166MHZ and 200MHz parts you mentioned above.

Take a look at all of our recent motherboard reviews. Notice that the motherboard in Dream Machine 97 comes with onboard SCSI, five PCI slots, and dual P-II processor support. Hell, you can even get motherboards with genuine Creative Labs SoundBlaster 16 support onboard.

Email clinic@bootnet.com to deliver your fearsome queries. If you're having trouble with a particular system, make sure to note your full configuration.

Sean Cleveland
disc editor

Brad Dosland
editor-in-chief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Andrew Sanchez
hardware editor

Sean Downey
software editor

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Product Information Number 372

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EACH MONTH, **BOOT** EDITORS GATHER THE **BEST** PRODUCTS IN A SPECIFIC **CATEGORY** AND DEEM THEM: **BOOTWORTHY**

THIS MONTH:

Speak

The Under $100 Crowd

Altec Lansing ACS45

THE ACS45s ARE GREAT AS EITHER YOUR MAIN SPEAKERS, OR REAR-FILL FOR A SURROUND SOUND SYSTEM.

Altec Lansing's decision to drop the price of its ACS45s from $99 to $79 makes this even more of a kick-ass speaker system than ever before.

The ACS45's three-way subwoofer satellite system consists of a 4-inch long-throw woofer mounted in a vented enclosure; desktop real-estate is taken up by a pair of 3-inch full-range speakers mounted in sealed cubes. The components share the same white plastic cosmetic finish, while electronic volume controls sit on one of the satellites.

Don't let the low wattage—6W per satellite and 20W for the woofer—fool you. These buggers rock, easily out-booming other speaker systems claiming three-times the wattage. These speakers, with the subwoofer corner-loaded for maximum bass, will produce impressive sound across a wide spectrum, although the 3-inch full-range satellites tend to peter out on the high end.

It may not have the subterranean low-end or hyper-crystalline highs of other systems, but the ACS45's solid performance and loud, clean volume keeps up with the bigger boys, putting many of them in their place.

product info

Price $79
Company Altec Lansing
Phone 800.648.6663
URL www.altecmm.com

THE PC WORKS MAY BE SMALL, BUT THEY CARRY SOME BIG SOUNDS.

Cambridge Soundworks PCWorks

The latest three-piece system from the wizards at Cambridge Soundworks heralds an official entry into the multimedia speaker arena, and breaks the sub-$100 barrier with a combination of crystal-clear highs and surprisingly solid bass.

The PCWorks consist of mini 2-inch versions of Cambridge's amazingly crisp and clear cubic speakers. Housed in sealed cubes, the sounds that emanate from the PCWorks satellites will bring tears of joy to your eyes. Never has a speaker system at this price sounded so damn good. Everything across these puppies' frequency response rings true, and the highs these things push are nothing short of phenomenal considering there's no dedicated tweeter.

But what good are exceptional mids and highs without a little bass back-up? Cambridge packs a 5.75-inch woofer in a ported enclosure to handle all those beefy bomb-drops, although response falls off dramatically below 60Hz. But when coupled with the 2-inch satellites, the system produces a rich sonic landscape with clever acoustic engineering equalizing the system to a new level of excellence.

product info

Price $99
Company Cambridge Soundworks
Phone 800.367.4434
URL www.hifi.com

ers

The next time you venture into Dungeon Keeper's *subterranean realm, close your eyes and listen for a minute. Does the rhythmic thrumming of your dungeon heart send seismic shock waves through the room? Can you hear barefoot imps scamper down cold tiled floors? Does the Redbook audio soundtrack make you shiver in anticipation of the coming carnage? No?*

Then your speakers suck.

A bootWorthy speaker system can make or break even the dreamiest machine. With all the time you'll spend in front of a glowing CRT, those speakers had better be ready to crank out Mingus and the Dungeon Keeper's *omniscient voice with equal gusto.*

Sizzle in Da Middle

Altec Lansing ACS48 PowerCubes Plus

These amazing speakers only come standard with one system we know of—*boot's* own Dream Machine 97. If it's good enough for *boot*, you know it's good enough for anyone ready to rock the bells until the break of dawn.

Building on the solid legacy of the ACS45, this sub-$150 three-piece subwoofer/satellite combo comes with one of the heaviest subwoofers to ever strain the bootLab's floor joists. Weighing in at 16 pounds, the 6-inch paper-cone woofer inside a particleboard, vented enclosure provides loud and tightly controlled bass. The satellites consist of the same 3-inch midrange drivers that sit inside the ACS45s, but the addition of a 3/4-inch tweeter takes care of any high frequency shortcomings the ACS45s had. Don't waste your time with the needless, integrated Dolby Surround sound stuff Altec puts in its "premier" multimedia systems—surround sound should be left to a dedicated decoder or receiver.

With 40W going to the bass and 20W per satellite, you'll have plenty of headroom when you crank it up. This system produces a wall of sound that's impossible to find in any other multimedia system at this price.

product info

Price $149
Company Altec Lansing
Phone 800.648.6663
URL www.altecmm.com

IT AIN'T HEAVY, IT'S MY 6-INCH SUBWOOFER—ALL 16 POUNDS OF IT.

THE SOUNDWORKS' SMALL BANDPASS ENCLOSURE FITS ALMOST ANYWHERE.

Cambridge Soundworks SoundWorks

Unless competitors rise to the Cambridge challenge and begin producing truly stunning speakers, they will continue to be tossed to the curb and fall short of bootWorthydom… Which brings us once again to Henry Kloss and his acoustic maniacs over at Cambridge SoundWorks.

When you start throwing a couple of C-bills into your multimedia system, it's time to get serious, and the SoundWorks are as serious as they come. Using the same cubic satellites as its bigger MicroWorks brother, this system opts for a smaller single-reflex bandpass box for its low frequency reproduction. The bi-amplified system pumps discrete power to the subwoofer and satellites.

Thanks to the efficient design of a bandpass enclosure, bass response is tight and loud, but the low-end rolls off at around 40Hz, so *Jurassic Park*'s T-Rex may not be as massive as it would be with a bigger woofer. But corner load this puppy and you'll coax some eye-opening acoustics. Combine them with those magical mids, and you have a state-of-the-art amplified mini-system fit for fragging.

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product info

Price $220
Company Cambrdige Soundworks
Phone 800.367.4434
URL www.hifi.com

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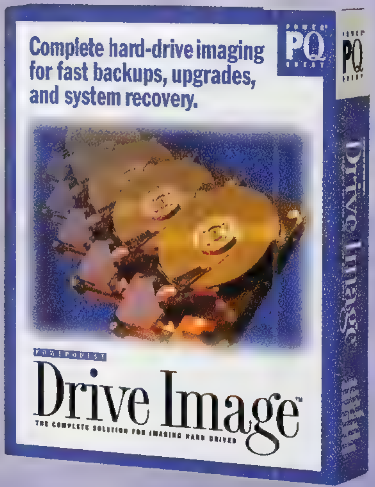
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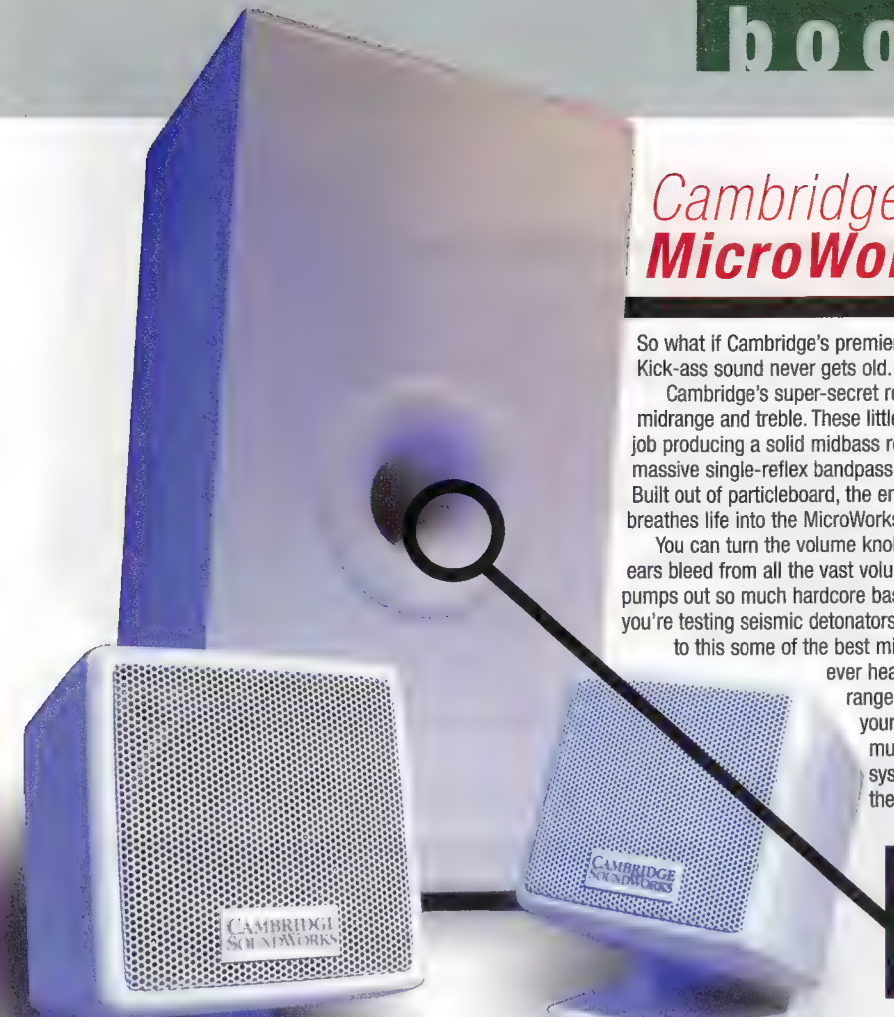
Product Information Number 281

Cambridge Soundworks **MicroWorks**



So what if Cambridge's premiere MicroWorks was a part of last year's bootWorthy? Kick-ass sound never gets old.

Cambridge's super-secret recipe consists of twin 3-inch full-range drivers providing the midrange and treble. These little tykes, housed in cubical sealed enclosures, do an incredible job producing a solid midbass response. The 6.5-inch long-throw woofer is housed in a massive single-reflex bandpass enclosure, with the solo vent producing all your big beats. Built out of particleboard, the enclosure also houses the 67W bi-amplified system that breathes life into the MicroWorks.

You can turn the volume knob about a quarter of the way up until you'll start to feel your ears bleed from all the vast volume. When properly corner-loaded, the bandpass enclosure pumps out so much hardcore bass, friends will think you're testing seismic detonators in your room. Add to this some of the best mids and highs you'll ever hear in this price range, and you've got yourself a high-end multimedia speaker system that exemplifies the word bootWorthy.

product info

Price $350
Company Cambridge Soundworks
Phone 800.367.4434
URL www.hifi.com

THE LONE PORT ACTS AS BOTH AIR CONDUCTOR AND CROSSOVER, FILTERING UNWANTED HIGH FREQUENCIES.

THIS LITTLE PRE-AMP CAN MOUNT INSIDE A FREE 5.25-INCH BAY. TRES RICO SUAVE!

Diamond **HPM-4100**

For the complete rundown on these sonic seducers, take a peek at page 97 for the review. But if you don't want to read through the entire rave, here's the watered-down version on why this Kick-Ass system rocks.

How about an 8-inch subwoofer in a massive, vented, MDF enclosure and some of the sweetest satellites you'll ever hear? Toss in the ingenious S2Bus interface, which allows desktop or drive-bay mounting of the system's pre-amplifier, and you're ready to rock with the best of them.

We think 100W of total system power should be sufficient to loosen the spackle off your walls.

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product info

Price $600
Company Diamond Audio Technology
Phone 310.582.1121
URL www.diamondaudio.com

Bass Mechanics

Cambridge Soundworks **PSW1**

What more can be said about a subwoofer that shakes the Imagine Publishing building down to its foundation?

Let's get one thing clear: This gargantuan woofer is designed for the ultimate in low-frequency reproduction. We're talkin' subsonics that'll sterilize and emphasize.

Force feedback? How 'bout full-body contact! *Pod* demolishes a room, turning the low-frequency growl of futuristic engines into a blast furnace from hell. *Quake's* blazing projectiles explode with the intensity of a nuclear detonation.

How is all this subsonic satisfaction accomplished? Try a single 12-inch subwoofer housed in a massive sealed enclosure powered by a dedicated 140W amplifier. The box is packed with all the fixing you'd expect from a high-performance sub, including a four-way crossover setting.

The only problem you'll ever encounter with the PSW1 is finding mids and highs loud enough to keep up with this beast. That's where a dedicated home receiver/amplifier and some shielded home speakers come in.

product info

Price $700
Company Cambridge Soundworks
Phone 800.367.4434
URL www.hifi.com

THIS BRUTAL BASS MECHANIC WILL TOPPLE TORNADOES, HORRIFY HURRICANES, AND CRUSH CAJONES.

YOU'D BEST BE CAREFUL WHERE YOU AIM THIS SELF-AMPLIFIED THING!

SAS **Bazooka** MS5

Not as bombastic as the PSW1, but no less impressive is SAS' initial foray into the multimedia speaker arena.

Based on the patented Bazooka tubular design, the MS5's 0.22 cubic ft. vented enclosure is designed for adding-in to speaker systems. A 5-inch treated-paper woofer is your bass mechanic, while a handy remote control gives you fully adjustable volume and crossover point controls.

The performance of the MS5 is heavily dependent on how you load the thing. Corner-loading the woofer gives you the best performance, with tightly controlled basses across its frequency response that never bottom out.

product info

Price $250
Company Southern Audio Devices
Phone 800.849.8823
URL www.sasbazooka.com

Crazy-Sexy Six Speaker/Amp Combo

Harman/Kardon System from Gateway **2000**

It's a stretch, but we had to include this awesome sound system.

This scrumptious sound system centers on the Harman/Kardon AVR10 Dolby Pro-Logic Audio/Video receiver. This multi-channel centerpiece is just packed with power, providing front, rear, center, and subwoofer output. The amplifier section gives each front and center channel satellite a cool 35W, while rear surround speakers get 20W a pop. The 8-inch subwoofer even has its own dedicated amplifier.

The low-profile center-channel speaker sits on almost any large monitor, and the entire system has enough power to scare the neighbors. Originally priced at $700, Gateway 2000 has lowered the total cost for the whole kit and kaboodle to $600—a tasty morsel that anyone can indulge in.

product info

Price $600
Company Gateway 2000
Phone 800.846.2080
URL www.gw2000.com

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Product Information Number 101

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File Edit View Special Options Win
PCM

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- Designed for today's demanding gaming and multimedia applications

Product Information Number 102

Sound
BLASTER AWE 64 Gold

Sound Blaster® AWE64 Gold

- Superior quality, low distortion, 90db analog and 120db digital audio outputs
- 4MB onboard RAM for SoundFont™ samples to experience E-mu 3D Positional Audio
- 64 voices of Advanced WavEffects™ Synthesis and WaveGuide Technology
- Includes S/PDIF output, gold-plated RCA line outs
- The premier solution for audio fidelity

Product Information Number 116

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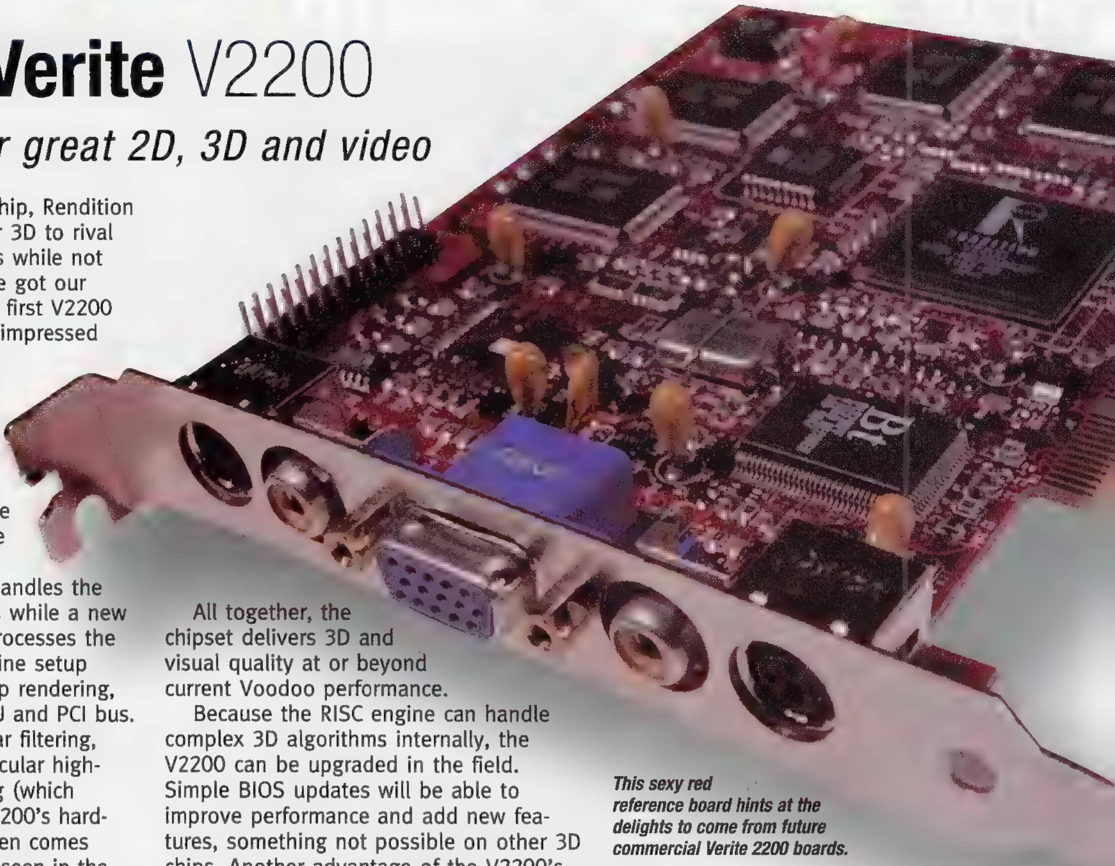
Rendition **Verite** V2200

RISCing it all for great 2D, 3D and video



This sexy red reference board hints at the delights to come from future commercial Verite 2200 boards.

With its second-generation chip, Rendition wants to prove it can deliver 3D to rival the best 3D-only accelerators while not skimping on 2D or video. We got our hands on one of Rendition's first V2200 reference boards, and we're impressed with the bundle of power.

As with the V1000, a programmable RISC core is central to the V2200. This high-performance heart can take a 12-attribute Direct3D pixel and render it in a single cycle. It's just as comfortable cranking OpenGL and native Speedy 3D input. The core handles the bulk of triangle setup chores while a new hardcoded triangle engine processes the final edge-walking and scanline setup steps in parallel, speeding up rendering, and taking a load off the CPU and PCI bus.

3D features include bilinear filtering, fogging, alpha blending, specular highlighting, and trilinear filtering (which requires two passes). The V2200's hardware-assisted anti-aliasing even comes close to the stunning quality seen in the Oak Warp 5's oversampled implementation.

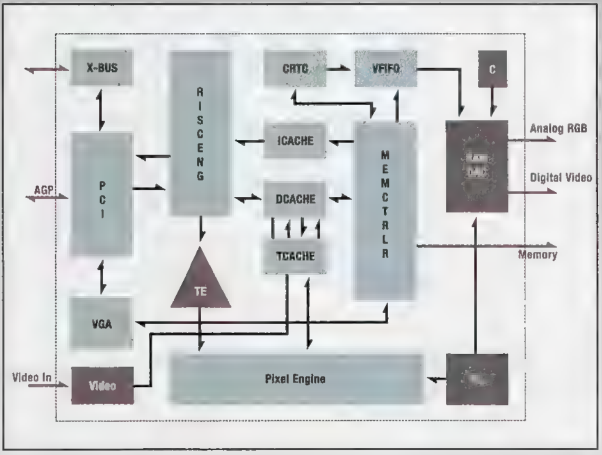
All together, the chipset delivers 3D and visual quality at or beyond current Voodoo performance.

Because the RISC engine can handle complex 3D algorithms internally, the V2200 can be upgraded in the field. Simple BIOS updates will be able to improve performance and add new features, something not possible on other 3D chips. Another advantage of the V2200's RISC is its size—valuable chip real estate isn't wasted on hard-wiring rarely used 3D features. This allows the svelte-and-sexy V2200 to weigh in at only 1.8 million transistors—smaller and less expensive to manufacture than most competitors.

The video features of the V2200 are stellar. MPEG-2 motion compensation is supported, allowing reasonable-quality

On our benchmark P200MMX, the V2200 can push **Forsaken** ***a solid 40 to 60fps at 640x480, and a very acceptable 30fps at 1024x768.***

The Heart of the V2200



Inside every video card that bears the Rendition V2200 is the embedded RISC engine, which includes a 128-entry register file, a five-stage pipeline, and fast load/store operations. Capable of addressing up to 16MB of RAM, the RISC engine also has a data cache and a texture cache.

The dedicated triangle engine offloads edge walking and scanline setup calculations from the RISC engine, as well as other setup chores. The engine is capable of rendering a triangle with all 12 Direct3D attributes at the rate of one cycle per scan plus one cycle per pixel.

The V2200 also includes a separate pixel-drawing engine and fill engine, plus an integrated RAMDAC capable of supporting clock rates from 170 to 230MHz.

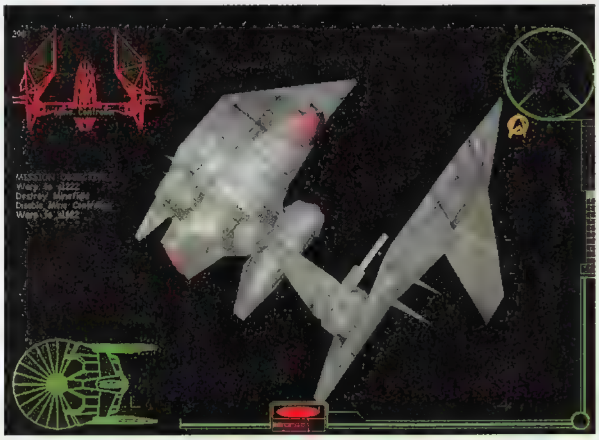
Direct3D, OpenGL, Rendition's own DOS-specific Speed3D, and the Win95-native RRedline API will give developers plenty to teeth on in the coming months.

Rendition Reference Board Beta 4.00 Drivers

Max 24-bit resolution/refresh	1152x864/70Hz
Max 16-bit resolution/refresh	1600x1200/75Hz
VESA 2.0 Support	Yes
MDK Perf-Test	96
Quake 640x480	16fps
Quake 800x600	11.1fps
TerraMarks (Level 1/2/3)	421 / 383 / 384

DVD playback with only a software decoder. The video scaler is excellent, but during preview testing choked when cranked to full-screen at 1600x1200, and suffered tearing problems at other times. The V2200 also provides digital video IN and OUT ports which, with the right support chips, can provide high-quality television output and capture. Our reference board was equipped with both ports, though not all V2200 boards will be.

The V1000's Achilles heel was its poor VGA performance, grinding pre-SVGA games to a crawl. The V2200 does not seem to be a VGA screamer either, but at least it's walking at a respectable pace. VESA 2.0 support is provided in the BIOS, and our DOS gaming tests delivered very satisfying results. 2D Windows performance was equally snappy, with performance to rival the best.



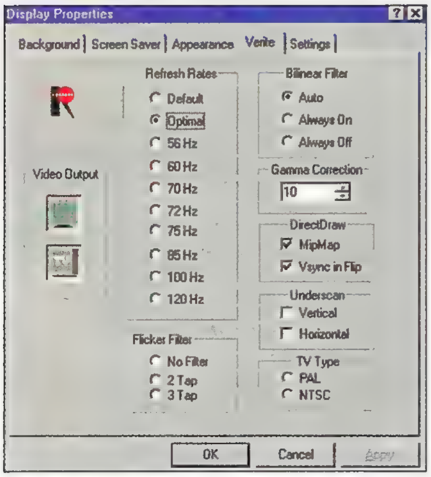
Interplay's Starfleet Academy is Direct3D-ready, and the V2200 is ready to pump those texture-mapped polygons.

The V2200 will feature a RAMDAC running up to 230MHz, allowing 16-bit color at 1600x1200 and 75Hz as a peak resolution, or 1152x864 with 32-bit color at 70Hz. The lack of a packed pixel mode to allow 24-bit color proves limiting though, ruling out true color at 1280x1024. Up to 16MB of 100MHz SGRAM will round out the beefiest V2200 boards, though most will likely support 4MB or 8MB.

Initially, the V2200 will only provide DMA mode, and AGP will be limited to 1x with no sidebands, but future Verite descendants promise to deliver a full AGP 2X interface.

The V2200 is late for the holiday rush, and at press time only Hercules and Diamond had announced plans to build cards based on the chipset. Thanks to fab delays, Rendition has missed a window of opportunity, but the final chip is so compelling, more card makers should be lining up soon. Just like last year, the 3D-only Voodoo2 may well pop on the scene to steal Verite's 3D thunder, and ATI and nVidia's latest chips leave plenty of room for fierce competition in the 2D/3D world. But our hands-on preview has convinced us that even if it's not a sure winner, the V2200 is a worthy contender.

—*Chris Dunphy*



Display Properties

Background | Screen Saver | Appearance | Verite | Settings

Refresh Rates
○ Default
● Optimal
○ 56 Hz
○ 60 Hz
○ 70 Hz
○ 72 Hz
○ 75 Hz
○ 85 Hz
○ 100 Hz
○ 120 Hz

Bilinear Filter
● Auto
○ Always On
○ Always Off

Gamma Correction: 10

DirectDraw
☑ MipMap
☑ Vsync in Flip

Underscan
☐ Vertical
☐ Horizontal

Flicker Filter
○ No Filter
○ 2 Tap
○ 3 Tap

TV Type
○ PAL
○ NTSC

Video Output

OK | Cancel | Apply

Rendition's baseline drivers have access to all your video functions. Expect card developers to tweak and optimize every aspect of the V2200 before slipping it into your hot little hands.

product info

Available Fall
Price $30 in quantities of 10,000
Company Rendition
Phone 415.335.5900
URL www.rendition.com

The boot Tracking Sheet

TITLE	DEVELOPER	DATE
SP-C2102 DVD-ROM for notebook	[illegible]	[illegible]
AMD K6 300MHz	AMD	[illegible]
AMD 640 PCIset AGP/100MHz bus	AMD	[illegible]
6x86MX-PR300	Cyrix	[illegible]
MediaGX MMX	Cyrix	[illegible]
Mobile Deschutes	Intel	[illegible]
440BX AGPset/100MHz	Intel	[illegible]
450NX PCIset/4 CPU	Intel	[illegible]

Trespasser

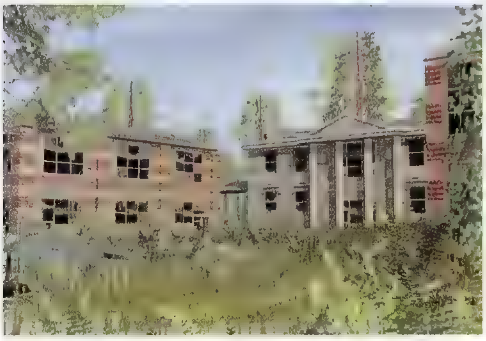
A toothsome morsel

A lush polygon paradise is disrupted by raptors running rampant in DreamWork's dinosaur-laden Trespasser.

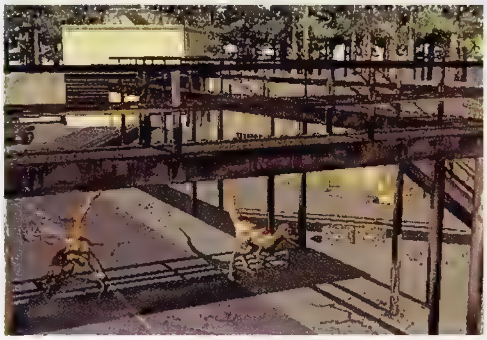
This saurian slug-fest is headed by DreamWorks' Project Leader ***Seamus Blackley****, who brought you the amazingly realistic physics of* Flight Unlimited, System Shock *and* Terra Nova.

boot What will set* Trespasser *apart from all the other first-person games out there?

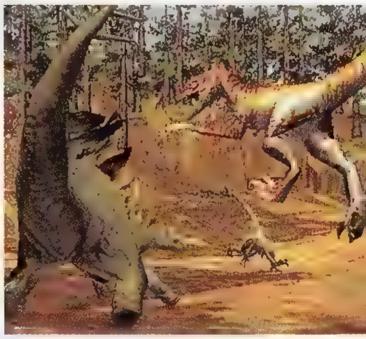
Blackley We're trying a fresh approach to the 3D gaming experience. The physics is going to open a level of realism and rich gameplay than no one has seen. Instead of the same dark sci-fi environment, we'll have open landscapes and lush, humid jungle, with light shafting down through the trees. And story: *Trespasser* is really the third release in the *Jurassic Park* saga. The island has a real history to it, and as you journey through it, a story emerges about the man who built it.



In Trespasser *you find yourself stranded on the eerie abandoned island where* Jurassic Park: Lost World *took place. The game is the official third installment of the movie series.*



An advanced bump mapping engine gives Trespasser's *texture maps a genuine sense of texture—hence creatures look so very realistic. Careful now, they're hungry!*



The dinos on the island are often more concerned with each other than with you, thanks to realistic AI.

boot What will your physics-based engine allow that's impossible in other games?

Blackley Physics will be the thing that revolutionizes 3D gaming. The list is practically endless.

Combat will be more creative and exciting; more like the fighting in an action movie. You'll find a much wider array of tactical choices. If a raptor comes into a room, instead of just shooting it you can snatch up a chair and throw it, or use a table as a barricade, or try and slam the door on it, or whatever. And the chair or the table can break when it hits the raptor. We'll have hit-locations, and the physical skeletons that control our dinosaurs can be pushed off balance, or selectively damaged by, say, a shot to the knee. And that's just for starters. Look at any Jackie Chan movie to see how inventive combat can get.

Physics allows us to build interesting puzzles in the 3D world. We can go way beyond just pressing buttons to open doors. You can think logically about geometry, and use your real-world physical intuition to accomplish goals. *Trespasser* is very much about the fun of trespassing, so you'll be breaking into realistically built buildings, and figuring out how to jigger locked gates. It's really going to add some depth to 3D gameplay.

Finally, immersion. When things behave in a physically correct manner—when a door breaks under stress, or a rock balances for a second before tumbling down a slope—it sends a message to the primitive part of your brain: "This is real."

boot What sort of special effects will your engine implement? Real-time colored lighting? Translucency? Shadows?

Blackley Yes, yes, yes, and more.

boot How big is the island, and how long will it take a player to cross?

Blackley The island is about three by five kilometers or 150 million polygons. It's taken from topographical maps which we have munged appropriately for gameplay, so it's not the kind of place the player can simply cross. There are mountains, ridges, gorges, forests, fences, and other barriers you'll have to figure your way around. Just as on a real hike, there's no right way, only better and worse—sometimes much worse—paths.

boot Will puzzles stand in your way, or is the game just fast action?

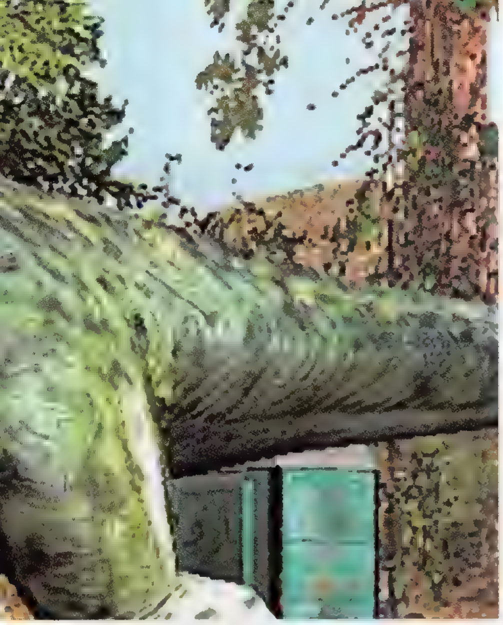
Blackley It's a mix. Lots of dinosaur action, but our physics-based engine is also a great venue for inventiveness. Interesting situations develop, such as three-way battles, collapsing bridges, etc., and we provide tools so players can build barricades, break down doors, improvise weapons—whatever they need to do to survive.

boot Can the entire island be freely explored or is it broken up into levels?

Blackley The island is one huge level—a sprawling wilderness with a few roads and pockets of civilization. When you get on top of a hill, some of the views are incredible.

boot How many dinosaurs are in the game?

Blackley At least six species, with distinct



Little hungry? Little hungry? In this genuine in-game shot, you, friend, are the McDouble. Blackley says the game's dinos are surprisingly simple: "350 polys or so."

individuals within those species. The raptors, for example, are quite advanced socially. There are three tribes of them, each having its own leaders and followers, each with separate habitats and territories. And each T-Rex is a personality unto itself. Things such as size, skin markings, scars, and behavior patterns set the dinosaurs apart from one another.

boot How complex are the dinosaur models? How are they animated?

Blackley In terms of polygon count, the dinos are surprisingly simple; 350 polys or so. But we have some tricks that make up the difference, as our screen shots should show.

Our dinos are animated by the physics system, on the fly—nothing is pre-animated. We have dinosaur skeletons that know how to balance themselves, and walk, and attack, and fall down, and that's what moves the models. So the dinosaurs will always react immediately and spontaneously to everything that happens in the world. If their foot hits a rock, they stumble, tumble, and even fall down a hill. It's always more fun to watch something screw up, run into a tree, trip down a gully, miss the door to a building, than to watch somebody's perfect run-cycle. In fact, probably the best way to defeat a two-ton, 5,000 horsepower carnivore that wants to pick its teeth with you is to trick it into doing something stupid. So, in essence, our dinosaur animation system delivers stupidity.

boot How advanced is the dinosaur AI?

Blackley Advanced—but not in the way that you might expect. The dinosaurs in *Jurassic Park* and *The Lost World* were very expressive, so we're making a point of having them express their mood in their posture; the way they hold their head, the way they walk.

It's a big priority to us that the animals behave like animals, and not like video game enemies. They have a system of weighted motivations and traits, so they actually feel hungry and thirsty and angry and afraid, and their goals come out of that. They graze and hunt and drink, and are as likely to fight with one another as with you. By making the dinosaurs as realistic as possible, we give you the sense of intruding on an ancient ecology that was already running before you came there.

So while we're not breeding a race of chess-playing artificial geniuses, we are creating a technology that convinces you that the dinosaurs are real.

boot Is* Trespasser *strictly a one-player game?

Blackley We're trying so much new stuff in the game, we could never ship a multiplayer version in reasonable time. But give us a few months. Given the flexibility and the ability to build and destroy things in this game, we can think of no better way to humiliate our friends!

While multiplayer is great, single player is also great, when it's done well. A lot of the 3D games these days are only fun in multiplayer mode, because there's not enough when you play alone. We're trying to accomplish something here on the order of a good novel or videotape.

boot What caliber machine will be necessary to enjoy* Trespasser*? Will the game take advantage of MMX?

Blackley At first we shot for P120s, but it's shocking to us that you can't buy less than a 133 now. You'll need 16MB; anything above that will just speed things up and make them prettier. The renderer is totally scalable, by which we mean the detail level of almost every aspect of everything in the scene can be controlled by the user, from sorting to filtering to complexity. It's kind of like Dial-a-Framerate.

But the quality of your video card will affect framerate more than anything else. Almost everything in *Trespasser* is bus-limited, meaning that the faster we can put pixels to your display, down your bus, and into your card, the higher framerate you'll get. Buy a decent card!

MMX was designed for something completely different than what we're doing. People like Tim Sweeney *(Unreal)* are doing colored lights. We were thinking of doing some filtering, but the compromise we'd have to make—combined with the low user impact of colored lights and better filtering—made us use MMX in a more oblique way.

boot You've dogged 3D accelerators. Will* Trespasser *look just as good without one?

Blackley Rendering features—such as the one which allows *Trespasser* to draw 30,000 trees at 20fps or stretch skin over a dinosaur skeleton—are simply unsupported on today's 3D cards. Obviously *Trespasser* won't look substantially better on those cards because these things have to be done in the software. We'll draw everything we can with a 3D card, which should increase framerate and resolution for people who laid out the cash for the silicon.

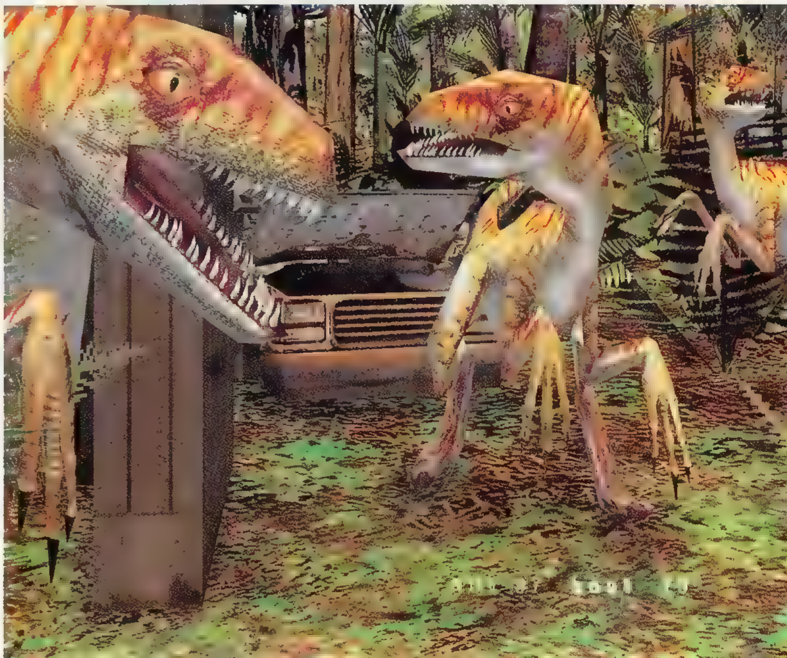
Look at the industry: It's been software-rendering innovation that has taken it to the place it is today, and also driven hardware design. It'd be a tremendous shame if PC games started to suffer from the same kind of homogeneous look that plagues console titles, or if the look of our new renderers were based on the quality of the implementation of a 10-year-old standard such as GL. On the other hand, there are plenty of creative, smart people making exciting new cards that specifically allow the kind of innovation that's going to keep the industry fresh.

boot Are there any sprites lurking in the game?

Blackley Over our dead, decaying, raptor-chewed bodies.

product info

Available ***Q1/98***
Price ***$50***
Developer/
Publisher **DreamWorks**
Phone ***213.938.7600***
URL ***www.trespasser.com***



Blade Runner

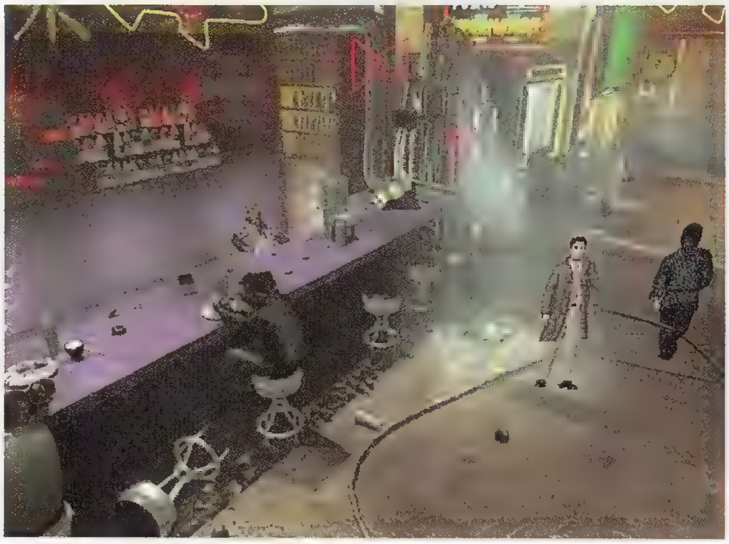
Does Westwood dream of electric sheep?

You're Ray McCoy, rookie Blade Runner assigned by the L.A.P.D. to track false leads and public complaints. You're assigned to investigate an animal murder by some Nexus 6 replicants who hijacked a moon bus and came to earth to retrieve the DNA that extends their four-year life spans.

Your lieutenant wants you to retire those skin jobs. At first it's fairly easy to find the more careless ones, but during the investigation, you are framed as a rogue replicant. Now everyone's out to kill you.

The plot you unearth casts doubts as to your true origin: Are you a replicant created to hunt replicants?

boot spoke with Senior Producer ***Donny Blank*** *for the low down on this long-awaited title.*

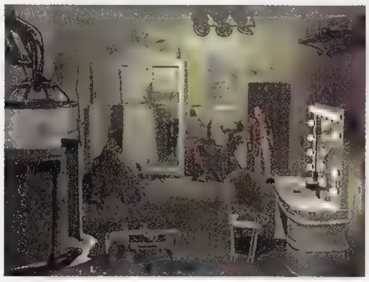


Blade Runner *appears to be non-interactive cinema until you point and click, and your character moves where you've directed him.*

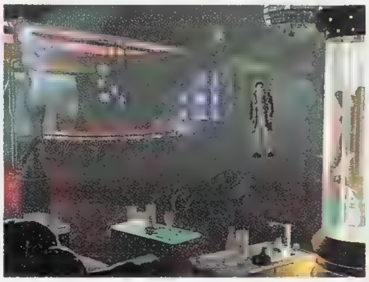
***boot** Where in the Blade Runner timeline will this game take place?*

Blank Our game takes place in the Los Angeles of 2019, the same time as the film. You pursue your suspects while Deckard is looking for his at the same time. Your world is interactive and almost anything can happen, but you cannot change anything that happens on screen in the film.

Our target playing time of over 20 hours required the creation of many additional 3D sets to explore in the interactive environment. We've recreated most of the locations from the film, and added many more of our own. *Blade Runner* will have one hundred locations in all, including the Tyrell Corporation, the Police Station, China Town, Chew's Eyeworks, the Bradbury Building, and many more.



Dynamic lighting effects provide ample opportunity to lurk in the shadows.



In Westwood's new engine, the amount of detail is limited only by your PC's memory.

boot** What kind of gadgets can gamers expect from* **Blade Runner?*

Blank Fans of the flick should have a lot of fun with the goodies we've provided. You'll have your own Voight-Kampff machine to test potential replicants, an ESPER Machine to analyze photos back at your apartment, a spinner to take you around town, and a very cool Knowledge Information Agent (KIA) to keep track of your investigations.

***boot** Tell us about the graphics engine.*

Blank PC owners have never seen anything like this before. It boasts a real-time environment in 640x480 resolution with millions of colors and a consistent 15fps. The characters alone are rendered with tens of thousands of polygons in real-time and are affected by volumetric light, shadows, and alpha effects such as lens flares.

***boot** How does the engine render such detailed characters in real-time?*

Blank We had to invent a new technology for the characters. We went back to voxel technology and used it as a launching pad. We're not using voxels, but sort of "voxels plus." We use voxels to do the 3D rotations, transformations, and projections that create the character, but we actually use a very fast engine to render polygons to the screen.

***boot** How do you animate characters with such high polygon counts in real-time without bogging down the game?*

Blank Since every pixel isn't a voxel, we're able to achieve higher frame rates with more polygons on the screen. We also dramatically sped up the engine's core 640x480 16-bit graphics scene animator so more time could be devoted to rendering and lighting the characters and objects.

In order to create a true 3D environment, we track a pixel-perfect Z-buffer for each frame of animation. That's in addition to the 640x480 16-bit animating scene. The Z-buffer allows characters to move behind objects in the scene. For added realism, the 640x480 Z-buffer is constantly updated during the camera moves.

***boot** Who controls what the fixed camera shows?*

Blank The game designer currently predetermines the camera view. However, there are moving cameras within specific scenes and in many cases while transitioning from scene to scene.

***boot** What sort of special effects can we look forward to out of this new game engine?*

Blank The current engine supports fully animated lights. They can blink, move, rotate, or change color. All the basic light types are used—omnis, round and rectangular spots, and directional lights, with attenuation and so forth. When rendering an actor, the lights are sampled heuristically to avoid excessive lighting computation.

The game engine also supports many true translucent effects like fog/mist, fire, smoke, lasers, shafts of light, etc. Special lighting modes allow us to dynamically cast light on characters or objects in the world. This gives us the power to have a character walk out of a dark corner into a shaft of bright light. Without special effects like these it would have been impossible to recreate the rich mood and ambiance of the motion picture.

product info

Available	December '97
Price	$50
Developer	Westwood Studios
Publisher	Virgin
Phone	800.874.4607
URL	www.westwood.com

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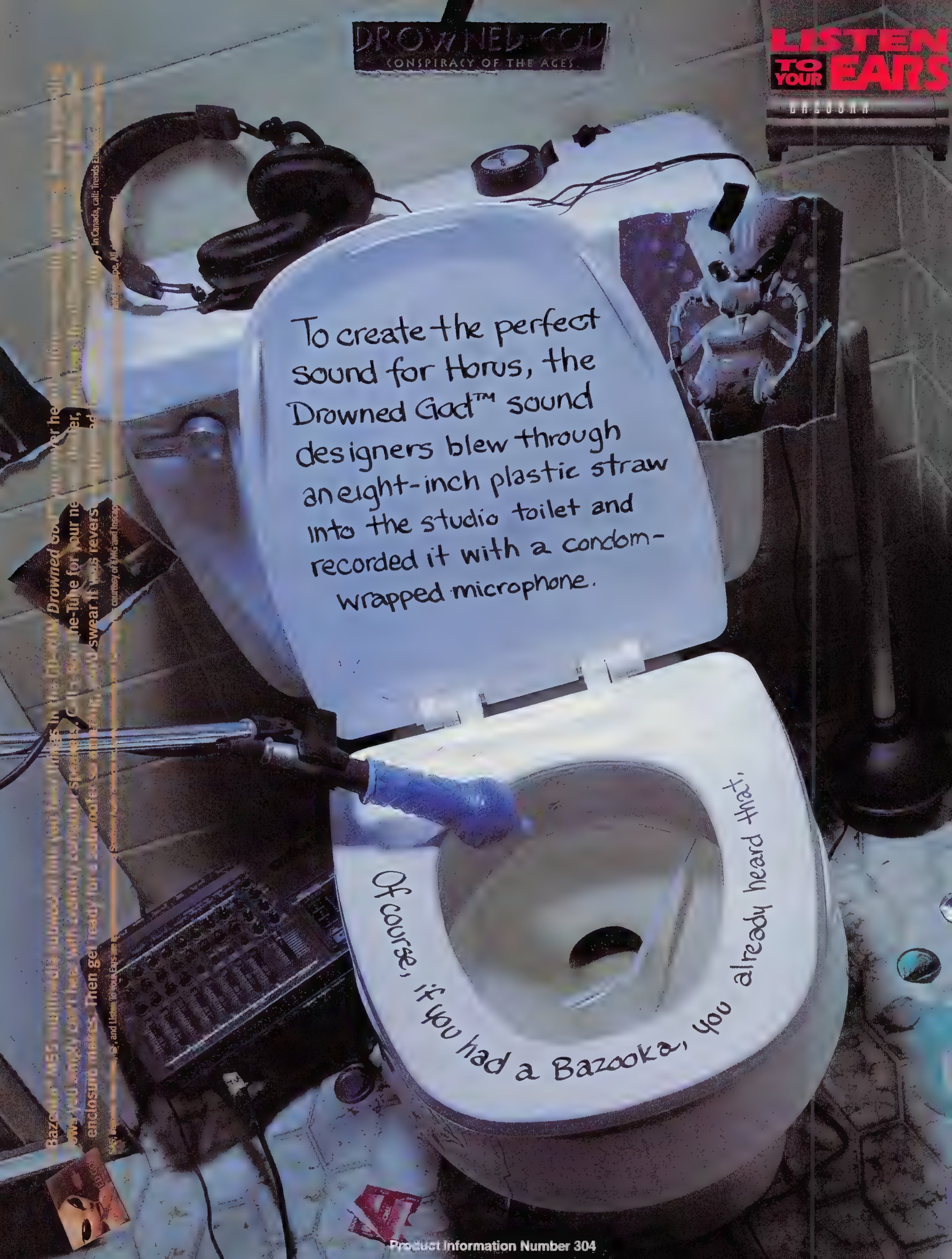


To create the perfect sound for Horus, the Drowned God™ sound designers blew through an eight-inch plastic straw into the studio toilet and recorded it with a condom-wrapped microphone.

Of course, if you had a Bazooka, you already heard that.

Bazooka® MSS multimedia subwoofer lets you hear things in the CD-ROM *Drowned God*™ you never heard [illegible] you simply can't hear with ordinary computer speakers. Call [illegible]-the-Tube for your ne[illegible] dealer, [illegible] enclosure makes. Then get ready for a subwoofer so amazing, you'd swear it was revers[illegible]. In Canada, call: Trends Ele[illegible]

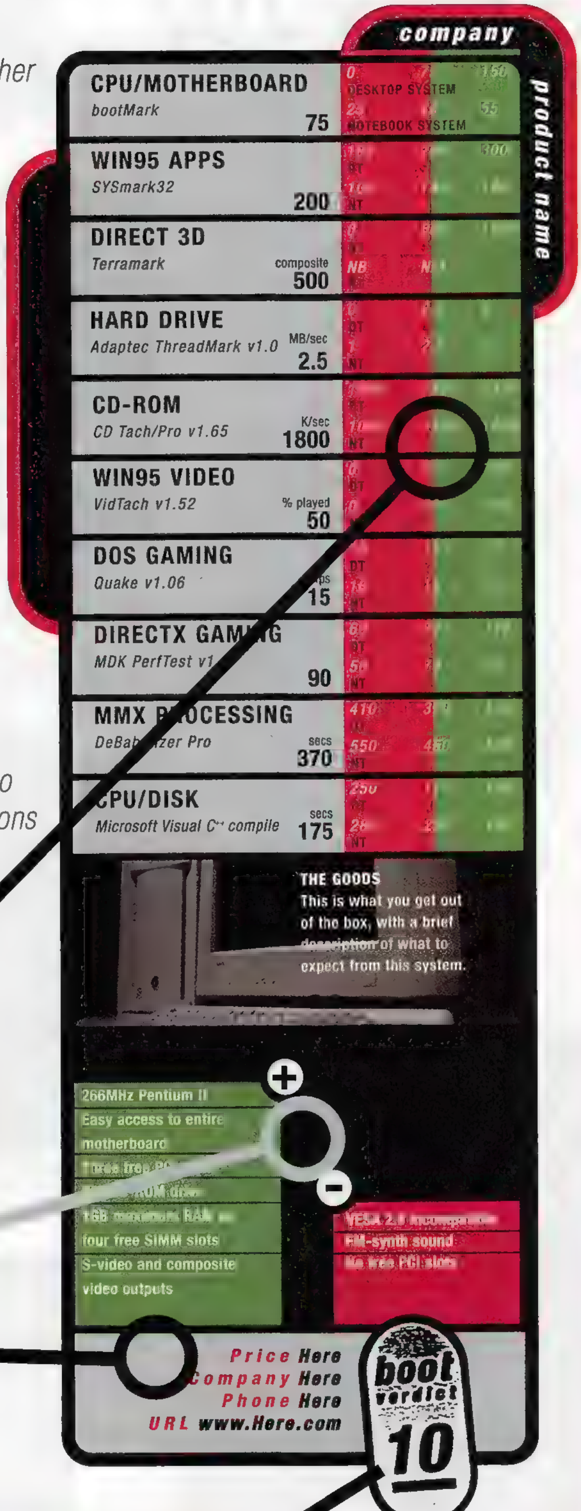
MSS, Bazooka [illegible], and Listen To Your Ears are [illegible] courtesy of GMG and Inscap[illegible] and Inscape. All [illegible]

Product Information Number 304

bootLab **Policy**

boot *isn't like any other computer magazine, and neither is our product-**evaluation** process. We don't test equipment in the cold, sterile environment of a warehouse-size lab, and we don't write our reviews based on the **test scores** that labcoat-wearing technicians scribble on clipboards.*

*Our review **scores** are based on a combination of objective **benchmark** testing, real-world performance, and our subjective evaluation of features, performance, and the many less tangible **characteristics** that go into a product. All of our evaluations are based on **hands-on** use of the product.*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Terramark
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DeBabelizer Pro
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370
CPU/DISK
Microsoft Visual C++ compile
secs
175
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This is what you get out of the box, with a brief description of what to expect from this system.
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Three free drive bays
CD-ROM drive
1GB maximum RAM
four free SIMM slots
S-video and composite video outputs
VESA 2.0 incompatible
FM-synth sound
No free PCI slots
Price Here
Company Here
Phone Here
URL www.Here.com
boot verdict
10

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PLUSES AND MINUSES
Here's where we list the best and worst a system has to offer.

CONTACTS
Look here for price, and the company's phone number and URL if you want more information.

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The one that really matters. This score reflects how we feel about a system, taking into account the benchmark results, quality of parts, usability, overall performance, and our intense, under-the-hood scrutiny.

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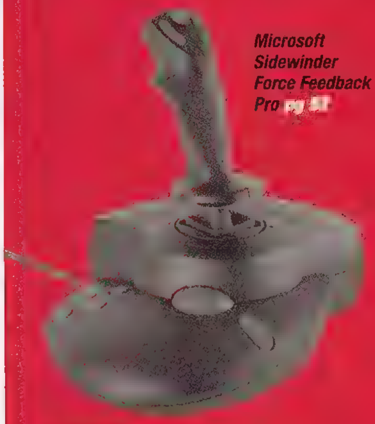
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Sony VAIO PCG-707

Palatable Purple Pleasures

In the colorless cascade of black and gray notebooks, the VAIO's elegant purple trim definitely catches your eye. And within this lilac love-in is enough power to capture your rapture.

A genuine Pentium 166MHz with MMX provides the flower power, but instead of the usual EDO coupling, the VAIO is augmented by an even cooler 32MB of SDRAM. You'll enjoy a minor performance boost, but until higher bus speeds emerge with Intel's Slot 2 mobile Deschutes processor, the advantage of SDRAM is negligible.

NeoMagic's MagicGraph 128XD chipset (a *boot* favorite) with 2MB of video memory provides the video subsystem. One of the best video solutions around, the 128XD's full-screen MPEG playback and scalability are among the best we've seen, with only miniscule tearing during complete screen redraws. AVI playback was just as good: Only two of the 1,700 test frames dropped during our sadistic VidTach test. The 12.1-inch display is excellent, exhibiting no flex whatsoever. Off-axis viewing is terrific, as well. For you big-screen freaks, TV-out ports are included on both the notebook and on the docking station. About the only thing missing is an analog brightness control for quicker adjustments.

With the Sony name, you'd expect the VAIO to include a grandiose audio subsystem. Sadly, it doesn't. Although the onboard ES1878 audio chip can interface to a wavetable chip, Sony engineers opted not to include one, leaving only FM crap for your listening pleasure. (Note to Sony: Give the engineers at Micron a call. They included a good hardware wavetable solution alongside the ES1878 chip in their Transport XKE, and it sounded stunning). On the positive side, the speakers are intelligently positioned, and do a good job of pushing audio. The headphones and the tiny remote for CD-ROM control are also cool.

The other integrated components, including the removable hard drive and zippy 14.5x CD-ROM drive, performed well, but a larger hard disk would've been preferred. You'll have to do the old switcheroo for simultaneous access to the floppy and CD-ROM drive, or you can remove both and throw in the handy weight saver instead.

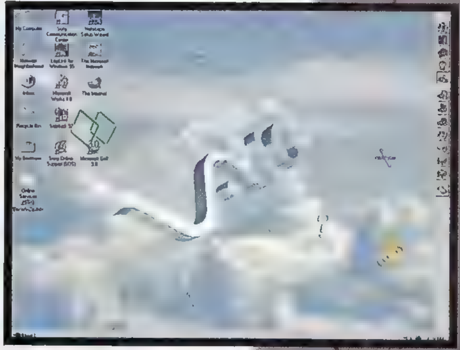
The groovy $599 docking station adds an eclectic assortment of extra ports, including twin USB and PS/2 ports, SCSI, and network connections. There's also a 4-pin IEEE 1394 connector, and a gameport (which is missing from the notebook itself).

Sony scores the hat trick by packing a lethal mix of power, functionality and performance in a remarkably lightweight and sleek design. With a base weight of less than six pounds and a case that's a mere one and a half-inches high, the VAIO notebook is both attractive and capable.

— *Bryan Del Rizzo*

And For My Next Trick

NeoMagic's MagicGraph 128XD is a great chip, but contrary to rumors, it's not a true Direct3D hardware accelerator. Software acceleration is accomplished through optimized drivers, and a 128-bit system architecture. The chip also supports bus-mastering for reduced CPU overhead.



POWER PANEL
The PowerPanel is a pop-up utility giving you easy access and customization for a variety of system features, including power management settings.

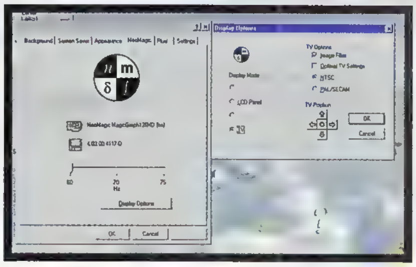
under the hood

REAL-WORLD BATTERY LIFE
02:02:00

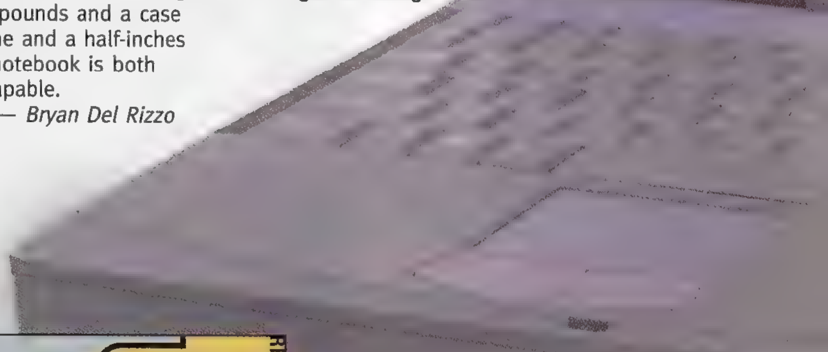
THE BRAINS	
CPU	Intel Pentium 166MHz
L2 Cache	256K pipeline burst SRAM
RAM	32MB SDRAM (128MB maximum)
Video	NeoMagic 128XD (2MB EDO DRAM)
THE BRAWN	
Hard Drive	IBM 2.02GB
CD-ROM	Sanyo 14.5x
Expansion Bus	Two Type II; One Type III; CardBus and Zoomed Video compatible
Ports	One USB; one PS/2; one parallel; one serial; one monitor
Lap Weight	5 lbs., 13 ounces
Carrying Weight	9 lbs:, 6 ounces
THE BEAUTY	
Display	12.1-inch active-matrix screen
Sound	ESS1878 FM-synth only
Video	1024x768, 16-bit color
Speakers	Stereo
Communication	Built-in 33.6Kbps modem, IrDA port

THE BUNDLE Columbia Tristar Video CD Sampler I CD Extra I Microsoft Automap Streets Plus I Microsoft Golf I Swiv3D I Quicken SE I LapLink for Windows 95 I Microsoft Works I Easy Photo I Oil Change

boot 1:32 *down* :05



BIG-SCREEN ACTION
If you're planning on connecting the VAIO to the boob tube, the MagicGraph 128XD includes utilities to adjust the picture, image filter, and refresh rate.



CD-ROM TO GROUND CONTROL

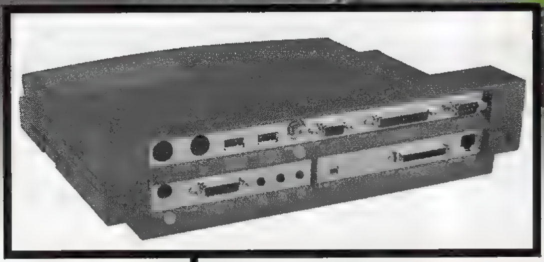
The VAIO includes a miniature pair of headphones with a nifty remote control for the CD-ROM drive.

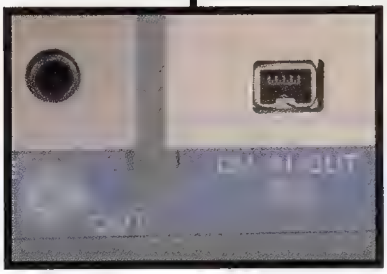
BEHIND THE PURPLE DOOR

The two PC Card slots are Zoom Video and CardBus compatible. The 33.6Kbps modem is cleverly hidden to the right just behind the PC Card pop-out buttons.

JOCK DOCK

The optional $599 docking station is replete with a ton of features including a RJ-45 10BaseT Ethernet connector, a SCSI-2 interface connector, two USB ports, and a bonus drive bay accommodating a CD-ROM or floppy drive. There's also a bay to recharge the battery while running on AC power.





VIDEO VIXENS

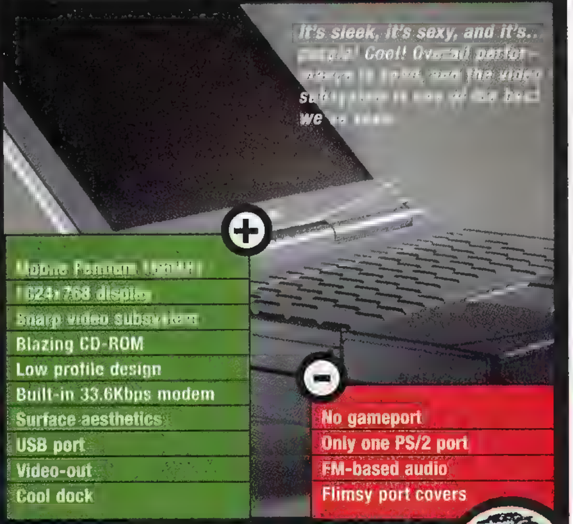
The docking station integrates a 4-pin IEEE 1394 digital video port to connect FireWire peripherals such as Sony's Digital Handycam Camcorder, allowing for the camera to the PC and vice-versa. Since 6-pin IEEE 1394 devices draw power from the main source—in this case, the PC—you'll need a 4-pin adapter to use a 6-pin IEEE 1394 device with the VAIO dock.

Sony

VAIO PCG-707

real-world benchmarking

CPU/MOTHERBOARD *bootMark*		48.5
WIN95 APPS *SYSmark32*		142
DIRECT3D *Terramark*	composite	*not applicable*
HARD DRIVE *Adaptec ThreadMark v1.0*	MB/sec	2.22
CD-ROM *CD Tach/Pro v1.65*	K/sec	1784
WIN95 VIDEO *VidTach v1.52*	% played	99.9
DOS GAMING *Quake v1.06*	fps	14.0
DIRECTX GAMING *MDK PerfTest v1.4*		79
MMX PROCESSING *DeBabelizer Pro*	secs	440
CPU/DISK *Microsoft Visual C++ compile*	secs	179



It's sleek, it's sexy, and it's... purple! Cool! Overall performance is solid, and the video subsystem is one of the best we've seen.

+
- Mobile Pentium [illegible]
- 1024x768 display
- Sharp video subsystem
- Blazing CD-ROM
- Low profile design
- Built-in 33.6Kbps modem
- Surface aesthetics
- USB port
- Video-out
- Cool dock

−
- No gameport
- Only one PS/2 port
- FM-based audio
- Flimsy port covers

Price $4,499
($599 for docking bay)
Company Sony Electronics
Phone 888.476.6972
URL www.sony.com

boot verdict 9

A complete breakdown of benchmark results is available on the *bootNet.* Point your browser to www.bootnet.com

Elsa **Winner** 2000/Office

OpenGL spoken here

Elsa's all-in-one video card, the Winner 2000/Office, issues a direct challenge to Matrox, Number Nine, and ATI.

Permedia 2—3Dlab's latest prosumer-level 3D accelerator chipset—powers the Winner 2000/Office, and packs a slew of new features. The original Permedia NT processor combined the power of the Glint Delta and Permedia. This time out, a 230MHz, 64-bit RAMDAC, AGP and PCI interfaces, and SDRAM or SGRAM support (from 2MB to 8MB) have been added. Like it's previous incarnation, Permedia 2 is armed with an integrated 100Mflop geometry set-up engine with high-precision fixed-to-floating conversion and 16-bit Z-buffer.

Under the Ax

O/S:	Windows 95 OSR2 Build 1212
Test machine:	Micron Millenium Mxe P200MMX
RAM:	32MB of EDO-DRAM
Resolution:	1024x768 @ 16-bit color, 75Hz

Benchmark	**Score**
MDK PerfTest v1.4	95
Quake 320x200	44.0fps
Quake 640x480	N/A
Quake 800x600	N/A
TerraMarks (Level 1/2/3)	404 / 391 / failed
SYSmark32 Official Score	192
Desktop Publishing	210
Desktop Graphics	280
Desktop Presentation	169
WP	199
Spreadsheet	186
DB	200

S-Video, composite inputs, and a lone S-Video output join the fray in this latest outing.

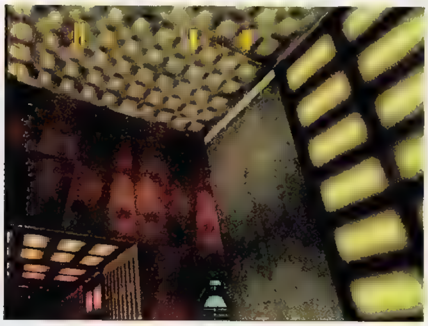
The Elsa supports your favorite APIs, including Direct3D, OpenGL and QuickDraw. While 3Dlabs says the Permedia 2 packs VESA 2.0 compliance, the current BIOS lacks support (but flash BIOS makes upgrading a snap). Adding the Winner 2000/Office to a system proved uneventful, with quick and easy driver installation for Windows 95 and NT.

As an entry-level OpenGL/NT solution, the Winner 2000/Office lives up to its name. The 8MB model we tested posted *Viewperf* scores that crush the Millenium II and Revolution 3D reviewed in *boot* 13. Windows 2D performance at 1024x768/16-bit color is on par with the Millenium II, but the card came up short under other tested resolutions. *MDK* Perftest performance blasted in at a cool 99, while Direct3D performance posted a 795 total TerraMark, despite failing level-three testing. *Terracide* moved along at a cool 37fps, but the current drivers have problems with transparency. Expect the frame rate to grow as new drivers are released.

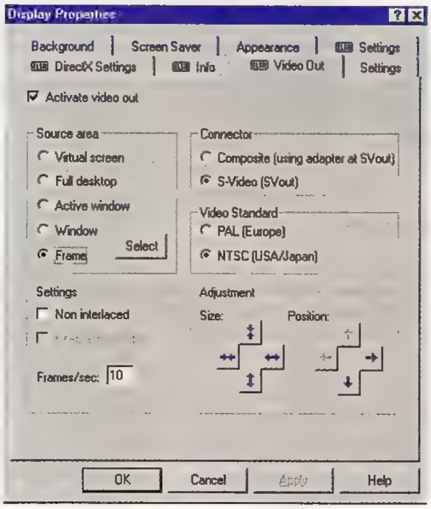
The specs:

Max 32-bit resolution/refresh	1280x1024 / 75Hz
Max 16-bit resolution/refresh	1600x1200 / 75Hz
BIOS:	ELSA v00.00.10
Win95 Drivers:	v4.10.0106
OpenGL drivers:	v5.24.00.158, 4.0.52
VESA 2.0 support	NO
Virtual Desktop Support	NO

The Winner 2000/Office supports most 3D enhancements, including fogging, bilinear filtering, and alpha blending. Unfortunately, the bilinear filtering needs work, producing a speckled dithered effect when viewed closely.



The Permedia 2 handles Direct3D titles well—but it doesn't pack the polygon horsepower of a 3Dfx card.



☑ Activate video out

Source area
○ Virtual screen
○ Full desktop
○ Active window
○ Window
● Frame

Connector
○ Composite (using adapter at SVout)
● S-Video (SVout)

Video Standard
○ PAL (Europe)
● NTSC (USA/Japan)

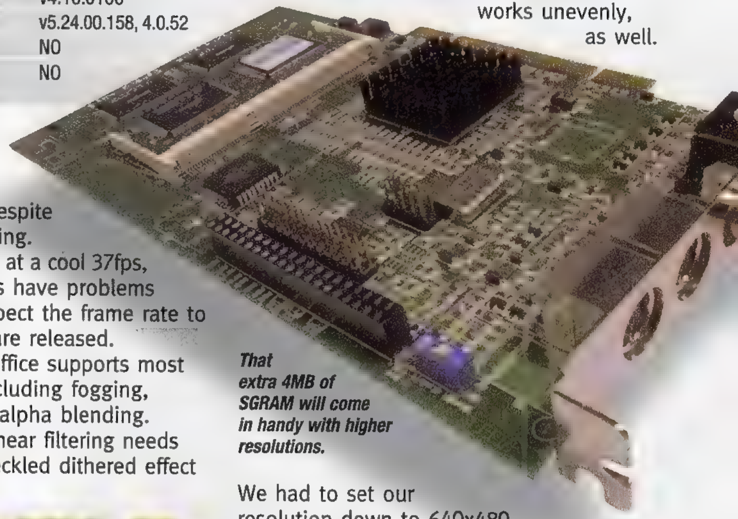
Settings
☐ Non interlaced
☐

Frames/sec: 10

Adjustment
Size:
Position:

From here, you can poke and prod your settings.

The biggest problems were with video playback. While the card never dropped a frame in our AVI or MPEG1 tests, pixelated edges and shimmering compression artifacts were in full effect. This definitely ain't ATI. The video on the Winner 2000/Office works unevenly, as well.



That extra 4MB of SGRAM will come in handy with higher resolutions.

We had to set our resolution down to 640x480, and do some serious fiddling in the control panel to get anything near viewable output. Even then, output was bad.

Whether it's in an entry-level NT rendering machine, or used in combination with a dedicated 3D accelerator, the Elsa Winner 2000 has a bright future—*if* Elsa continues to optimize the drivers.

—Andrew Sanchez

NT/OpenGL Perftest

Viewperf under NT 4.0 at 1024x768x16-bit color

O/S:	Windows NT 4.0 (Build 1381)
Test machine:	Micron Millenium Mxe P200MMX
RAM:	96MB of EDO-DRAM
Resolution:	1024 x 768 @ True Color, 75Hz

Geometric Mean Composite Viewperf Score	
Awadvs-01	4.54
CDRS	18.44
DRV-04	2.06
DX-03	3.39
Light	0.40

All results are in frames per second.

Price *$299 (8MB version), $199 (4MB version)*
Company *Elsa*
Phone *800.272.3572*
URL *www.elsa.com*

boot verdict 7

IF GUNS FAIL, BRING IN DOGS.

IF DOGS FAIL, BRING IN TEAR GAS.

IF TEAR GAS FAILS,

BRING IN HELICOPTERS.

DARYL F. GATES'
POLICE QUEST
SWAT 2

Welcome to the world of Daryl F. Gates and the LAPD. Here, a thin blue line separates law-abiding society from kooks, crazies, terrorists and sociopaths. The choice is yours. Join the good guys and learn LAPD SWAT tactics, strategies and scenarios. Or become one of society's miscreants, and take it to the establishment with grenades and rocket launchers. Alone or on-line, no two missions are alike. It's not just another day in L.A. Then again, it is. Available this Holiday season.

RP

SIERRA

IF HELICOPTERS FAIL,

BRING IN THE NEGOTIATION TEAM.

Demo at www.sierra.com/swat2.

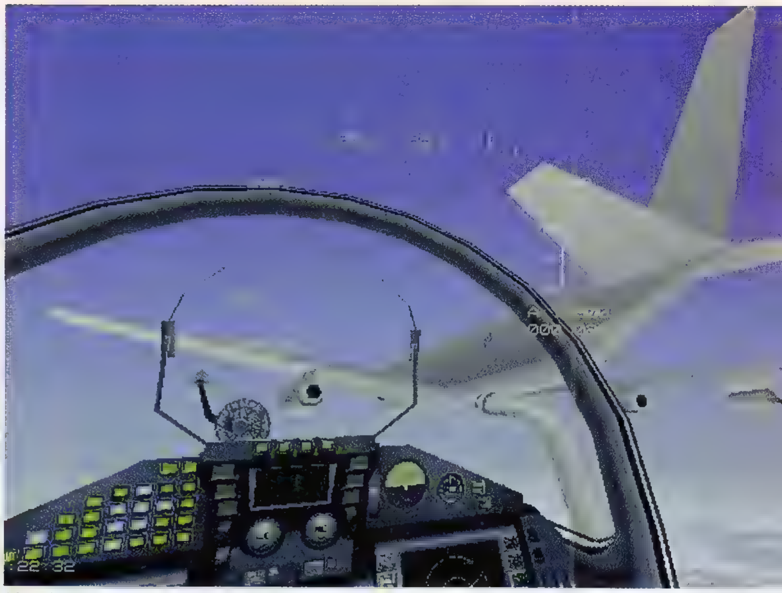
Product Information Number 312

EF2000 v2.0

How Swede it is

CHECKLIST

Maximum Resolution/Color
640x480/16-bit
MS-DOS
Win95 Native
3D Software Acceleration
DID proprietary
3D Hardware Acceleration
Rendition 3Dfx
DirectX
DirectDraw DirectSound
DirectPlay DirectInput
Multiplayer
LAN Modem Direct/serial
TEN

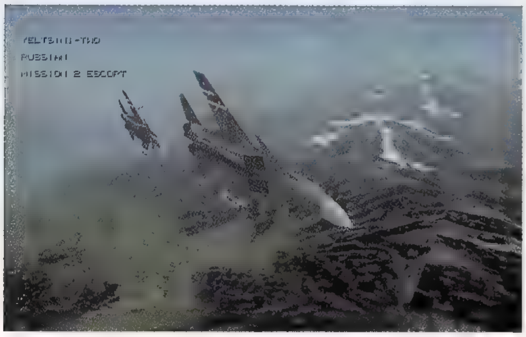


Virtual cockpit panning eases maneuvers such as in-flight refueling in EF2000 v2.0.

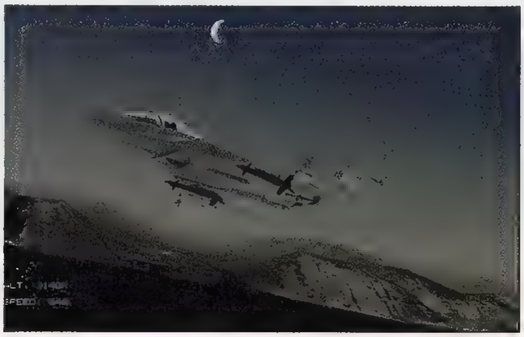
This flight sim has a lot to offer, but its jaw-dropping visuals are the best reason to jump in the *EF2000 v2.0* cockpit. Accelerated by either 3Dfx or Rendition hardware, Digital Image Design's 3D engine effortlessly displays breath-taking texture-mapped terrain at 2,000 beautiful polygons a pop.

In action, the visuals combine with full avionics, HUD readouts, and audio cues to reproduce the gut-feeling of modern fighter combat. Radio communication is the typical minimalist menu of phrases enlivened by realistic AWACS messages that may send you on a side-mission to handle a new enemy incursion. Joystick response is fluid, but controls are considerably less graceful for keyboard jet jockeys.

Ground detail is plentiful, with structures such as dams looking truly at home nestled in deep valleys. Airports are well-populated with buildings and runways meticulously detailed. Even when hissing peacefully along at 25,000 feet over moonlit cloudbanks, this is one sexy simulation.

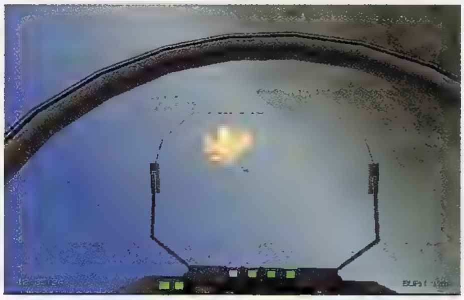


3D acceleration provides slick terrain and dazzling lighting effects.



Night flight never looked better than in 3D-accelerated EF2000 V2.0.

Capping the visual feast is a virtual cockpit that lets you swing your view smoothly through 360 degrees, look down at instrumentation, or even see the joystick moving in your lap. Padlock views automatically track bandits, wingmen, and incoming enemy missiles.



Virtual cockpit tracks the action, but HMD keeps instrument readings in sight.

3D acceleration smoothes terrain textures, and pegs the frame rate to 28fps. The un-accelerated Win95 version looks only slightly grainier, with a fluid frame rate of 24fps at 640x400 on a P166. Acceleration is only available as DOS executables, one each for 3Dfx- and Rendition-based cards. The 3Dfx version runs cleanly under Win95, but we had to completely disable our SideWinder joystick driver in Windows before the game recognized the joystick. Unfortunately Internet play (direct or via TEN) works only with the Win95 version.

The *EF2000 V2.0* campaign game is based on NATO-Russian conflict in Norway and Sweden, and is managed dynamically by an AI engine called WARGEN. This keeps track of more than 2,000 ground units, 500 ships and 1,000 aircraft. WARGEN decides when a neutral country is defeated, or becomes hostile because you "accidentally" took out one of its planes. Based on such info, it creates random missions, prioritizing targets, assigning aircraft, selecting weapons, and even plotting waypoints based on topography.

New in *v2.0* is the ability to take over all aspects of mission planning. You pick the target, the starting airfield, and the number and type of aircraft in the flight, then draw waypoints on a map. You can even plan in-flight refueling.

Unfortunately, the new version's intricately detailed campaigns aren't fleshed out with real-world detail. Several pages in the manual set up the political situation, but to assess progress after each mission, you have to interpret a fistfull of tables and graphs.

All told, *EF2000 v2.0* packs enough blistering technology and well-honed gameplay to take this advanced European aircraft to the stratosphere, with detailed avionics and eye-popping visuals that'll have you wetting your jumpsuit when you get there.

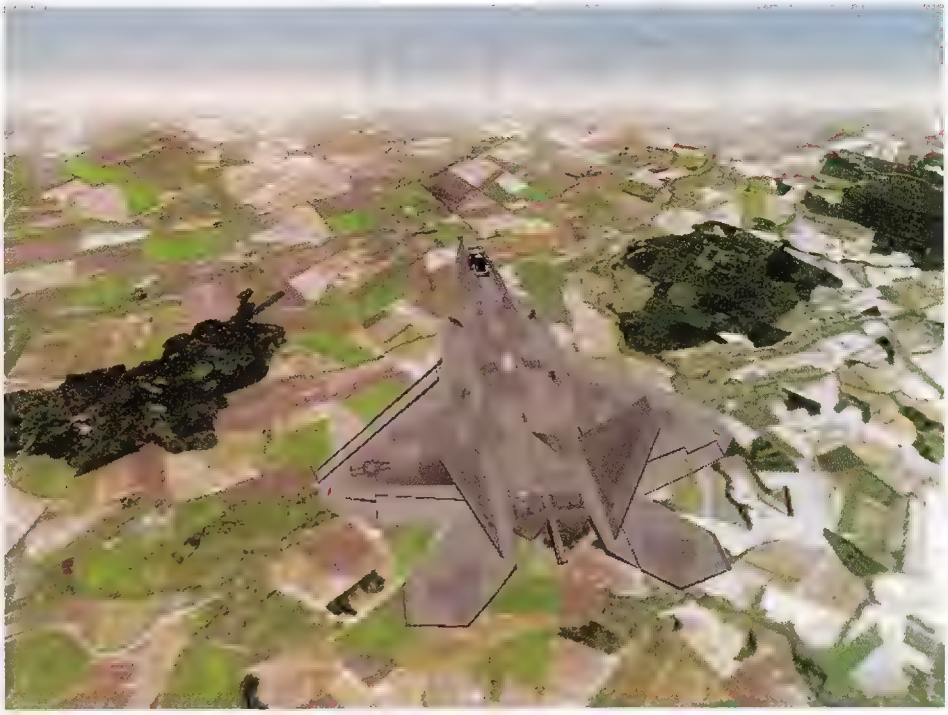
—*Frank Lenk*

Price $50
Developer Digital Image Design
Publisher Ocean
Phone 408.289.1200
URL www.did.com

boot verdict 9

iF-22

Afterburner delight

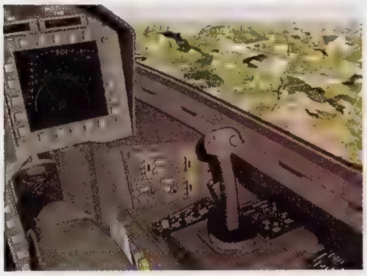

iF-22 puts detailed aircraft over a satellite-imaged landscape of the Ukraine

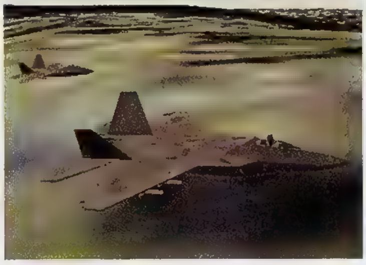
Like the aircraft, *iF-22* is a futuristic bit of technology that pushes the envelope in all directions. In its first in-house-developed flight sim, Interactive Magic has done a good job of using technology not just for flash, but to build credibility.

The simulation depicts two plausible future conflicts: a Serbian-invaded Bosnia, and a newly democratic Ukraine. The third scenario, set in the Persian Gulf, is available directly from Interactive Magic for about $20.

The DEMON-1 3D engine is optimized to texture-map satellite images on to polygon terrain created from real-world elevation data. There's none of the extreme mountain relief you'll see in other sims, such as *EF2000,* but scenery is accurate enough to allow visual navigation over an entire 80,000-square mile campaign area.

High frame rates are maintained by limiting the number of on-screen polygons to about 2,500, and limiting resolution of distant elements. A P166 has no trouble keeping things fluid at 800x600, and isn't half-bad at the maximum 1024x768, although higher resolutions make the terrain pixels glaringly obvious.


Detailed instruments and accurate MFD information are the core of this sim.


Limited relief and smooth terrain textures look more realistic from 10,000 feet.

Enabling Direct3D hardware acceleration has more impact on aesthetics than on performance, eliminating all trace of pixelation in the terrain, and providing some awesome transparent cloud and haze effects.

The cockpit view is "active," allowing you to use the mouse to click on buttons or the detailed MFD displays. A padlock mode tries to keep your target in sight, but there are just eight fixed view directions rather than a full virtual cockpit.

Missions are randomly generated based on a complete simulation of the campaign theater. The situation intensifies according to the outcome of each mission, with a fudge-factor applied to magnify your personal effect on the campaign. This is then used to generate a new set of missions. You always get a choice of five or so, including basic air patrol, escort and ground attack.

This scheme produces a near-infinite variety of missions set in a very active world. The trade-off is that missions do tend to be fairly routine, with none of those (perhaps unrealistic) surprises that could only be scripted directly by a creative human author.

iF-22 uses DirectPlay to support modem, IPX LAN and TCP/IP. Up to eight pilots can fly single missions cooperatively, dogfight head-to-head, and even play capture-the-flag team missions in which the objective is to land a transport plane on a neutral airbase.

Despite its complexity, *iF-22* is surprisingly approachable, with a wide range of realism settings. Selecting the relaxed flight model, unlimited consumables, or novice enemy pilots lets a novice virtually joy ride through missions.

Given its scope, it's not surprising that *iF-22* does run into some hardware limits. While display performance is excellent, our P166 test system was plagued by intermittent half-second hesitations, as terrain data or sound effects were dragged off the hard drive. The effect is reduced but not eliminated by installing full terrain data to your hard drive (about 300MB per campaign theater), or switching to low-res terrain.

Aside from this one annoyance, it's hard to see how *iF-22* could be much better, given its design assumptions.

— *Frank Lenk*

CHECKLIST

Maximum Resolution/Color	1024x768/16-bit
Win95 Native	
3D Software Acceleration	Demon-1
3D Hardware Acceleration	Direct 3D
DirectX	DirectDraw DirectSound DirectPlay DirectInput
Multiplayer	LAN Modem Direct/serial Internet
Specialty Controllers	Win95 compatible Throttle Rudder Thrustmaster

***Price** $53*
Developer/Publisher
Interactive Magic. Inc.
***Phone** 919.461.0722*
***URL** www.imagicgames.com*

boot verdict 7

Sony **PCV-150**

Sooooo close to kick ass, it hurts

Sony's first desktop outing just missed our Kick-Ass award back in *boot* 08. The fatal flaws? Yamaha OPL-3SA FM-synth and a teensy matching monitor. This time, Sony has added hardware wavetable sound and a 17-inch tube, while tossing in Intel's fastest Pentium MMX processor and integrated video capture. Is this enough to earn our ultimate respect?

The PCV-150 uses the same tower case design as before, with two new additions dotting the gray faceplate: Iomega's 100MB Zip drive and a front-mounted set of A/V jacks. These three RCA jacks and an S-Video input located next to the Zip drive get A/V in and out without stretching cables to the rear. More surprises await once you crack the case's simple side panel.

Intel provides the 512K L2 cache-laden ATX motherboard. Sporting the 430TX PCIset, memory is handled via twin 168-pin DIMM sockets, maxing out system memory at 256MB of SDRAM. The motherboard uses the double-layer ATX I/O connector with twin USB and all your ports sitting pretty inside. The processor is kept cool by the ATX power supply fan sitting right on top of it.

Moving video off the motherboard, ATI supplies a 4MB All-In-Wonder, pumping the crystal-clear video playback you'd expect. This very special All-in-Wonder also has a custom connector with dual A/V inputs—very sweet. The LT-WinModem DSVD/14.4 fax/modem fills up an ISA slot. The one minor loose thread is the motherboard-bound Yamaha OPL3-SA chipset. Although the included hardware MPU-401 wavetable sounds better than soft-synth, it isn't as potent as an AWE-32 or a Roland SCC-1.

While Sony gives you all the power connectors and spare EIDE headers you'll need, the Zip and hard drive leave only a single 5.25-inch drive bay free. Sony's 14x-performing CDU611 EIDE CD-ROM drive and Quantum's 4320AT 4.3GB EIDE hard drive round out the storage options. And you best be happy with 'em, because with the PCV-150's nifty integrated cabinet, you won't be able to upgrade to a faster CD-ROM or DVD drive. All the cabling is neatly tied together, and a handy power-supply label still illustrates all jumper settings.

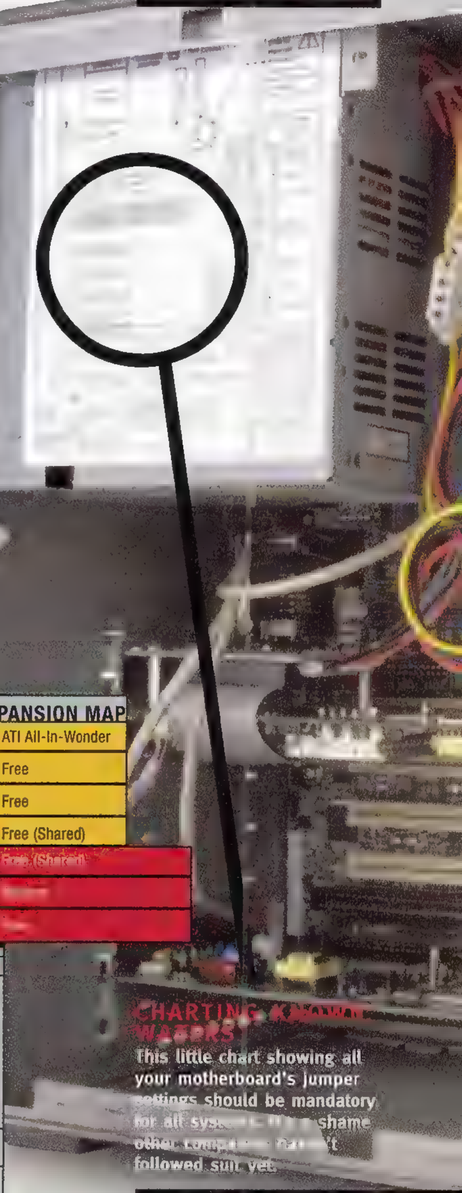
This time out, Sony has managed to muster the more grand CPD-220VS 17-inch monitor—much better than the dinky 14-inch CPD-100VS (see sidebar for the 411).

Under the throes of our benchmarks, the PCV-150 performed as expected, posting an average 60.6 bootMark—well within the P233 MMX realm. Unfortunately, Win95 apps are slower than on other similar systems, as is Direct3D performance. But hard drive performance is phenomenal, especially considering it's an EIDE drive. CD-ROM performance is also just as powerful, popping right off our charts. *MDK* PerfTesting spewed out a cool 100, while our *Debabilizer Pro* tests posted excellent scores for a P233.

While the PCV-150 is significantly better than Sony's premiere offering, it doesn't kick ass as is. Fire up an older DOS-based game, and you'll hear the Yamaha heart still beating within this beast. Overall, performance is middling, despite excellent details: the Zip drive, the custom All-In-Wonder vid card, the front-mount A/V ports, the graceful case, plentiful open slots. Toss in a real 3D card and an AWE32, and there's no reason this system couldn't kick ass.

—Andrew Sanchez

SITTING IN THE SHADE
Like all VAIO desktop systems, the CPU bathes in the forced-air cooling of the ATX power supply, although you'll need to remove the beast in order to get to the processor. Thankfully, that's easy to do.



CHARTING KNOWN WATERS
This little chart showing all your motherboard's jumper settings should be mandatory for all sys[illegible] shame other comp[illegible]'t followed suit yet.

under the hood

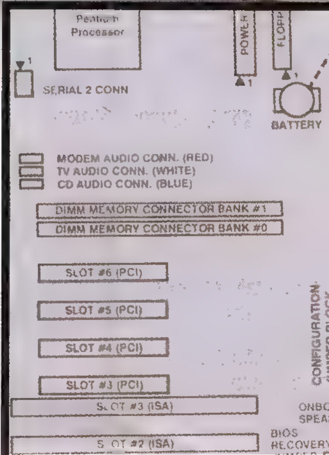
THE BRAINS	
CPU	Intel Pentium 233MHz MMX (P55C)
L2 CACHE	512K pipeline burst SRAM
RAM	32MB (128MB max)
Motherboard	Intel LT430TX ATX form-factor
THE BRAWN	
Video	ATI All-In-Wonder
Hard Drive	Quantum 4320AT 4.3GB EIDE
CD-ROM	Sony CDU611 24x Max EIDE CD-ROM
Expansion Bus	three PCI, two ISA, one PCI/ISA shared
Fax/Modem	LT WinModem
I/O Ports	two USB, two serial, one parallel, two composite video in, two S-Video in, two pair RCA inputs, one S-Video out, one composite out
THE BEAUTY	
Display	Sony CPD-220VS; 17-inch screen size; 1280x1024@60Hz
Sound	Yamaha OPL-3SA with hardware wavetable (integrated onto motherboard)
Speakers	three-piece subwoofer/satellite system integrated into Sony CPD-220VS monitor
Other	Iomega Zip drive, two-button mouse

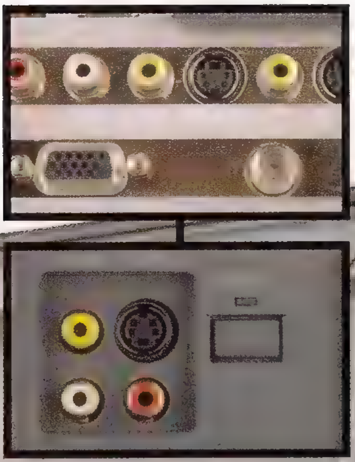
EXPANSION MAP

PCI	ATI All-In-Wonder
PCI	Free
PCI	Free
PCI	Free (Shared)
ISA	Free (Shared)
ISA	[illegible]
ISA	[illegible]

THE BUNDLE Microsoft Windows 95 | Sony Pictures Entertainment Video CD-ROM Sampler | MechWarrior Mercenaries | Civilization II | Billboard Music Guide | Blockbuster Video Guide to Movies and Videos | The Best of Microsoft Entertainment Pack (13 titles) | Launch | The Third Dimension | Electronic TV HOST | Quicken SE | Microsoft Works | Microsoft Money97 | Sidekick 97 | Microsoft Encarta 97 Encyclopedia | Microsoft Bookshelf | Reader Rabbit 1 | The Family Doctor | Sony Communication Center Telephony Suite with Video Phone Send/Receive | Asymetrix Digital Video Producer | PhotoSuite | DeltaPoint QuickSite | Kai's Power Goo SE | Microsoft 3D Movie Make | Macromedia Shockwave | VoiceView Client | Oil Change (SOS edition) | First Aid® '97 (SOS edition) | Sony System Recovery CD | Sony Application Recovery CD | Sony VAIO Space | Sony AV Suite | Microsoft Plus!

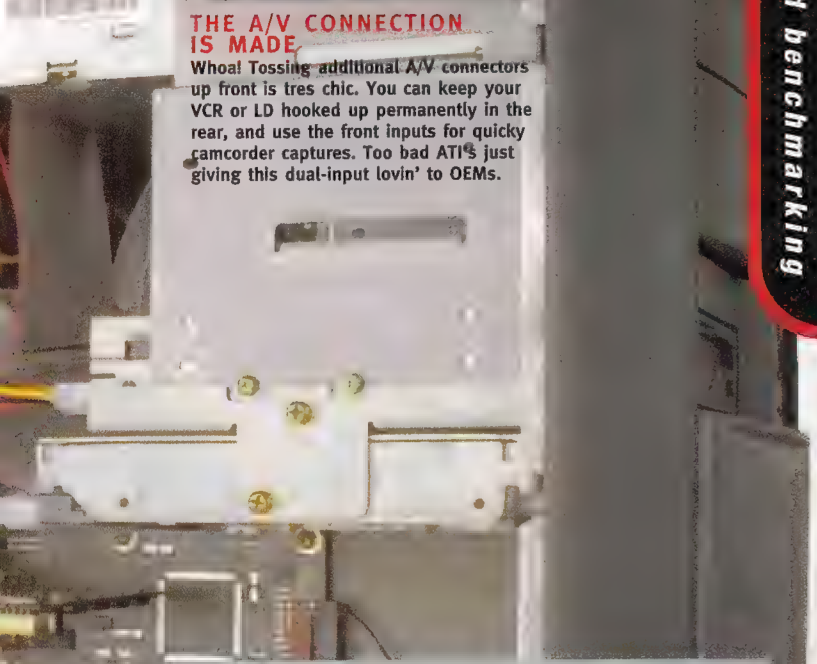
boot 1:11 **down** :05





THE A/V CONNECTION IS MADE

Whoa! Tossing additional A/V connectors up front is tres chic. You can keep your VCR or LD hooked up permanently in the rear, and use the front inputs for quicky camcorder captures. Too bad ATI's just giving this dual-input lovin' to OEMs.

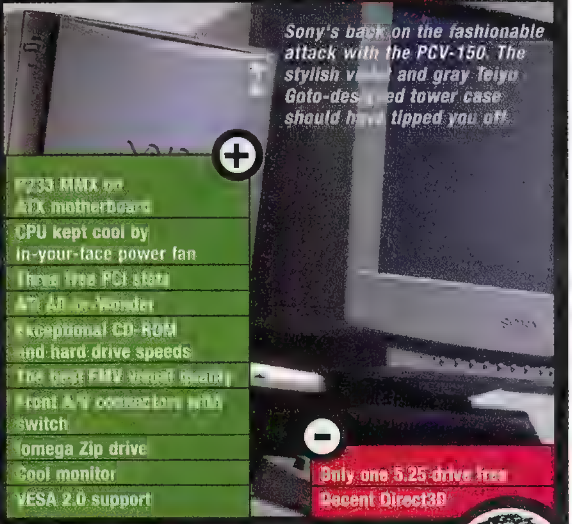


Sony

PCV-150

real-world benchmarking

Test	Benchmark	Unit	Score
CPU/MOTHERBOARD	*bootMark*		60.6
WIN95 APPS	*SYSmark32*		188
DIRECT3D	*Terramark*	composite	384
HARD DRIVE	*Adaptec ThreadMark v1.0*	MB/sec	4.24
CD-ROM	*CD Tach/Pro v1.65*	K/sec	2286
WIN95 VIDEO	*VidTach v1.52*	% played	38.8
DOS GAMING	*Quake v1.06*	fps	13.7
DIRECTX GAMING	*MDK PerfTest v1.4*		100
MMX PROCESSING	*DeBabelizer Pro*	secs	318
CPU/DISK	*Microsoft Visual C++ compile*	secs	195



Sony's back on the fashionable attack with the PCV-150. The stylish violet and gray Teiyu Goto-designed tower case should have tipped you off.

+

- P233 MMX on ATX motherboard
- CPU kept cool by in-your-face power fan
- Three free PCI slots
- ATI All-in-Wonder
- Exceptional CD-ROM and hard drive speeds
- The best FMV visual quality
- Front A/V connectors with switch
- Iomega Zip drive
- Cool monitor
- VESA 2.0 support

−

- Only one 5.25 drive free
- Decent Direct3D

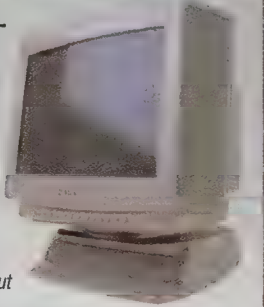
Price *$2399 system, CPD-220VS monitor add $900*
Company *Sony*
Phone *800.635.7669*
URL *www.ita.sel.sony.com/products*

boot verdict 9

A complete breakdown of benchmark results is available on the *bootNet*. Point your browser to www.bootnet.com

Sony CPD-220VS

Bigger is truly better



Before the CPD-220VS arrived, Sony owners had to settle for the feeble 13-inch viewing space of the CPD-100VS. But now, they can indulge in 16-inches of Trinitron CRT Technology with this violet behemoth of a monitor.

Besides the larger view, the CPD-220VS has integrated upstream/downstream USB ports, integrated microphone, as well as 1/8-inch headphone input/output connections.

The integrated subwoofer/satellite system does a much better job handling loud tunes than the CPD-100VS, although the bass is lacking, despite the three levels of bass boost. Don't expect to cause any rumbles in any jungles with these things. Despite this, they sound good, playing a variety of sound material well. The screen's apeture grille refused to shimmer or shake when playing low frequencies, but it did swim a little playing female vocals with the volume set at 100.

Dot Pitch	.25 mm
Maximum Viewing Area	16-inches
Resolutions supported (with PCV-150)	1152x864 @ 32-bit color / 75Hz 1280x1024 @ 24-bit color / 60Hz 1280x1024 @ 16-bit color / 60Hz 1280x1024 @ 8-bit color / 60Hz
Speaker set-up	3.5W x 2 for side speakers 10W subwoofer

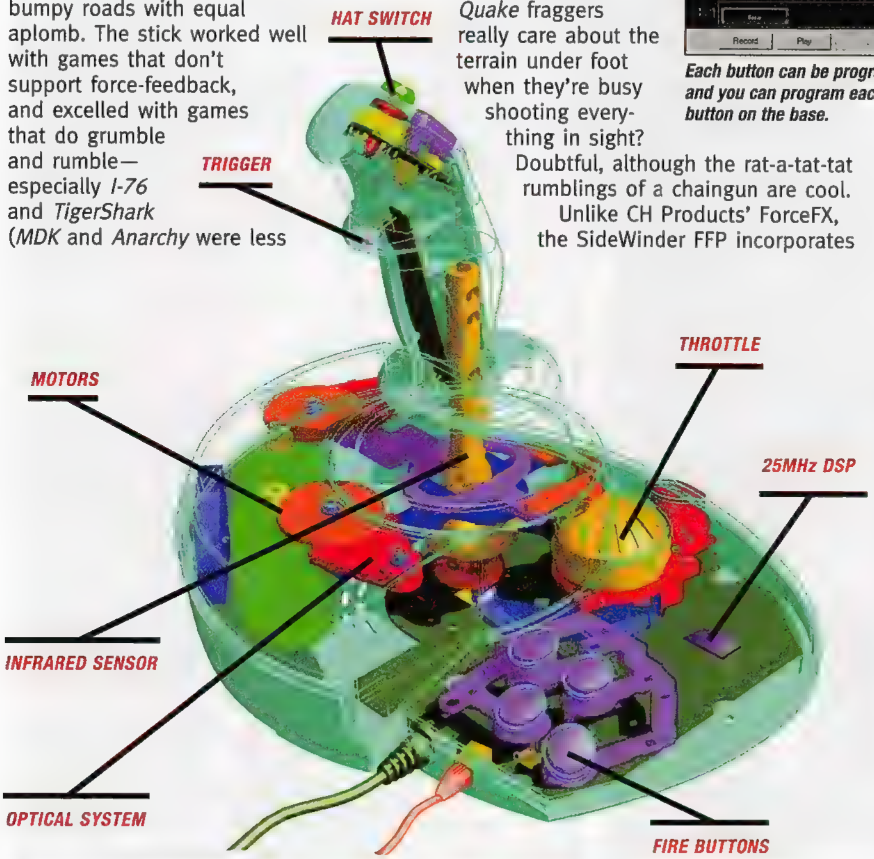
Microsoft **SideWinder** Force **Feedback** Pro

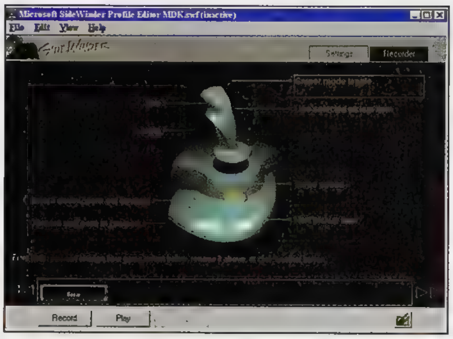
A stick with some serious kick

boot KICK ASS! PRODUCT

The SideWinder Force Feedback Pro digital joystick rocks. It also jolts, kicks, jumps, slams, buffets, slides, pumps, bumps and rips.

With smooth-as-silk responsiveness and extremely fluid control, the stick handled *MechWarrior 2*'s terrain, *Flight Unlimited*'s skies, and *Interstate 76*'s bumpy roads with equal aplomb. The stick worked well with games that don't support force-feedback, and excelled with games that do grumble and rumble—especially *I-76* and *TigerShark* (*MDK* and *Anarchy* were less impressive). Driving and flying games are naturals for force-feedback—feeling the road beneath your car in *I-76* and the underwater resistance in *TigerShark* is realistic enough to evoke hoots and hollers. But do *Quake* fraggers really care about the terrain under foot when they're busy shooting everything in sight? Doubtful, although the rat-a-tat-tat rumblings of a chaingun are cool.


HAT SWITCH
TRIGGER
MOTORS
THROTTLE
25MHz DSP
INFRARED SENSOR
OPTICAL SYSTEM
FIRE BUTTONS

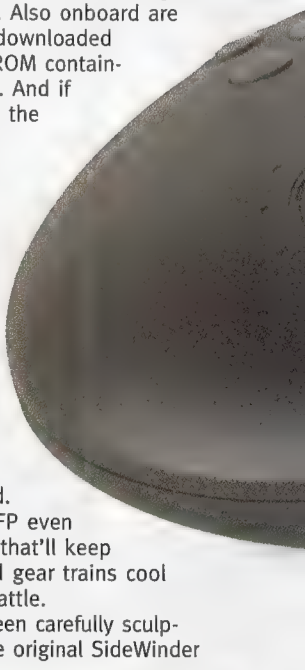

Microsoft SideWinder Profile Editor MDK.swf (inactive)
File Edit View Help
Settings
Recorder
Record
Play

Each button can be programmed for up to 32 keystrokes, and you can program each button twice using the "toggle" button on the base.

Unlike CH Products' ForceFX, the SideWinder FFP incorporates second-generation force-feedback technology to infinitely cooler effect. Among the technical innovations: an optical system providing precise game control, reducing drift and oscillation; an ergonomic handle suitable for left- and right-handed control; and a 25MHz, 16-bit DSP to offload complex effects algorithms from the CPU. Also onboard are 2K of RAM to store downloaded effects, and 48K of ROM containing 32 preset effects. And if that weren't enough, the stick's IR kill switch detects when you've released the handle. Best of all, the stick doesn't require a serial port, connecting instead via a MIDI (gameport) interface. The end result is a speedier (31.25Kbps) communication channel for sending those forces down the pipeline to your hand.

The Sidewinder FFP even sports a built-in fan that'll keep you, the motors, and gear trains cool during the heat of battle.

The handle has been carefully sculptured, and, unlike the original SideWinder

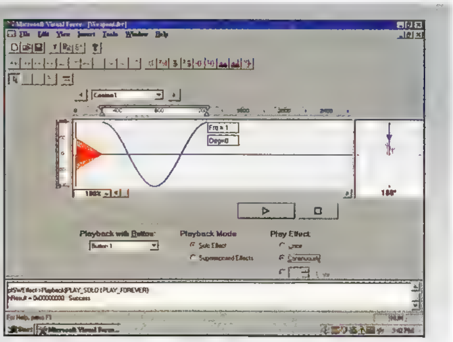


SWForce API

An API can make or break any new technology, and the SideWinder Force Feedback Pro is no exception. Not only does this stick have DirectX 5.0 to thank, it has the Visual Force Factory editor.

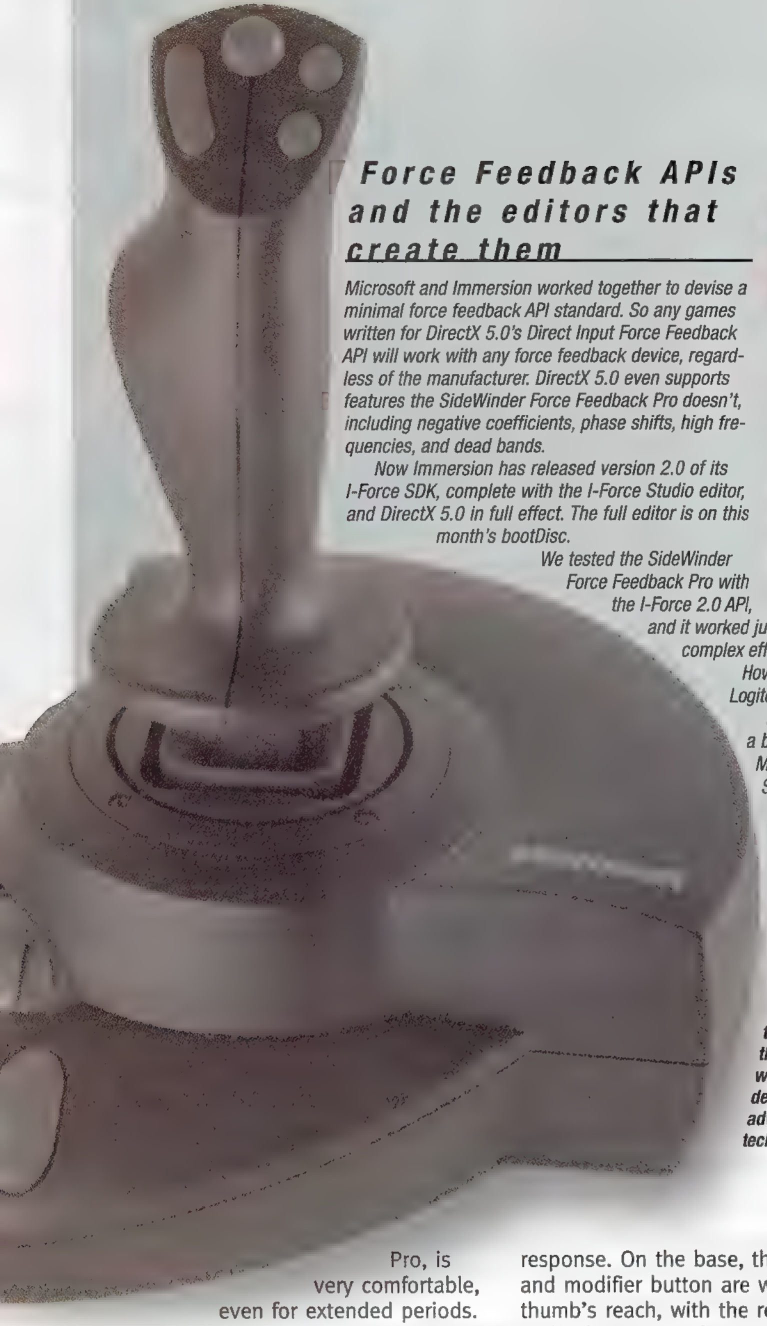
The SDK already includes a library of 100 optimized effects, including a very slippery "ice" effect, but aspiring developers will undoubtedly want to create their own, and this is where the simple and intuitive editor comes in to play.

Start with a sine or cosine, then use the editor's graphical interface to add in such elements as friction, dampening, gravity, acceleration, springs, and walls. By adjusting the amplitude and continuity of the sine wave, a new effect can be created in moments. New effects can then be used independently, looped together, or superimposed on one another and assigned to any or all of the joystick buttons or axes. Common effects are already stored in ROM, but onboard RAM enables developers to download their own creations on the fly for a unique gaming experience.


Microsoft Visual Force
File Edit View Insert Tools Window Help
Cosine1
Frq = 1
Deg=0
Playback with Button:
Button 1
Playback Mode
Solo Effect
Superimposed Effects
Play Effect
Continuously
For Help, press F1
NUM
Start
Microsoft Visual Force...

```
pSWEffect->Playback(PLAY_SOLO | PLAY_FOREVER)
hResult = 0x00000000  Success
```

The Visual Force graphical editor is almost too easy to use. Too bad Microsoft isn't releasing a consumer version.



Force Feedback APIs and the editors that create them

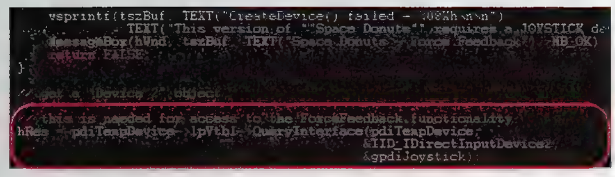
Microsoft and Immersion worked together to devise a minimal force feedback API standard. So any games written for DirectX 5.0's Direct Input Force Feedback API will work with any force feedback device, regardless of the manufacturer. DirectX 5.0 even supports features the SideWinder Force Feedback Pro doesn't, including negative coefficients, phase shifts, high frequencies, and dead bands.

Now Immersion has released version 2.0 of its I-Force SDK, complete with the I-Force Studio editor, and DirectX 5.0 in full effect. The full editor is on this month's bootDisc.

We tested the SideWinder Force Feedback Pro with the I-Force 2.0 API, and it worked just fine (although Microsoft's hardware couldn't handle some of the more complex effects such as angled walls).

However, Microsoft's Visual Force Factory would not recognize a prototype of Logitech's upcoming force feedback controller based on the I-Force 2.0 architecture.

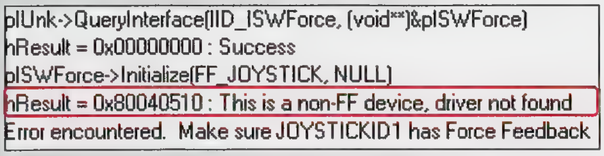
If game developers include OEM effects customized for one particular hardware, a brouhaha rivaling the current 3D API wars could develop. Both Immersion and Microsoft need to ensure SDKs work with all hardware, regardless of the manufacturer.



```
    vsprintf(tszBuf, TEXT("CreateDevice() failed - %08Xh\n\n")
                   TEXT("This version of \"Space Donuts\" requires a JOYSTICK de
    MessageBox(hWnd, tszBuf, TEXT("Space Donuts - Force Feedback"), MB_OK)
    return FALSE;
}

// get a "Device 2" object
// this is needed for access to the ForceFeedback functionality
hRes = pdiTempDevice->lpVtbl->QueryInterface(pdiTempDevice,
                                              &IID_IDirectInputDevice2,
                                              &gpdiJoystick);
```

Even though it should be querying for a non-specific DirectInput device (as evidenced in Space Donuts above), Microsoft's Visual Force Factory seems to be looking for a SideWinder Force Feedback Pro only and would not recognize a prototype I-Force 2.0 controller.



```
pIUnk->QueryInterface(IID_ISWForce, (void**)&pISWForce)
hResult = 0x00000000 : Success
pISWForce->Initialize(FF_JOYSTICK, NULL)
hResult = 0x80040510 : This is a non-FF device, driver not found
Error encountered.  Make sure JOYSTICKID1 has Force Feedback
```

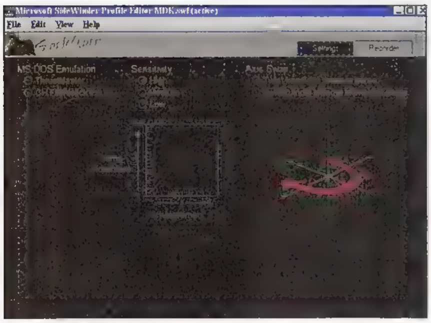
With or without the cool effects, this stick is a winner. Let's hope developers take advantage of the technology.

Pro, is very comfortable, even for extended periods. The buttons, including the oversized trigger and 8-way hat-switch, are all intelligently positioned, and offer excellent tactile response. On the base, the rotary throttle and modifier button are well within thumb's reach, with the remaining A, B, C and D buttons perfectly placed for your other digits.

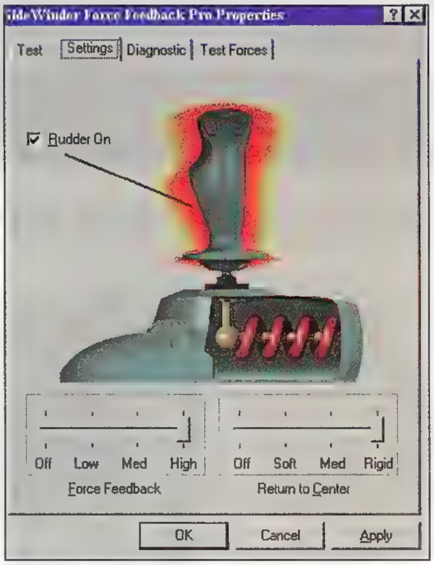
The programming interface is excellent. Control sets for approximately 30 regular games are included, as are settings for five force-feedback games: *MDK*, *TigerShark*, *MechWarrior 2*, *Flight Simulator*, and *Monster Truck Madness*. Each button can be programmed for 32 separate keystrokes, and if you use the shift button on the base, you can effectively program each button twice. Alas, you can't print the control sets.

While the success of force feedback as a technology is dependent on developers embracing it—check the bootNet site for a complete list of developers promising to join the force—the SideWinder Force Feedback Pro is definitely a winner.

–Bryan Del Rizzo



The SideWinder FFP works terrific with all games. You can take advantage of ThrustMaster or CH Flightstick Pro settings, adjust the overall stick sensitivity, and define how the twist rotation will work.



☑ Rudder On

With the new properties control panel, you can adjust the level of effects, set the return to center, diagnose any potential problems, and test some of the ROM effects, including a chainsaw.

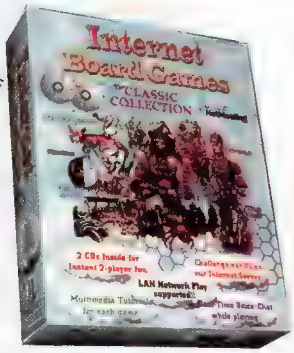
Price $150 (ships with full version of Interstate '76, and limited editions of Shadows of the Empire: Battle of Hoth and MDK: Mission Laguna Beach
Company Microsoft
Publisher GT Interactive
Phone 800.426.9400
URL www.microsoft.com/products/hardware/sidewinder/force-feedback/

boot verdict 9

Without going out of your door,
You can know the ways of the world.
-Tao Teh Ching
Lao Tzu
STONE MASTER
Internet Playable Board Games
http://www.game-club.com
©1997 JC Research Inc.

The Internet is bringing the world a little bit closer...

Internet Board Games
The Classic Collection
of 11 Strategy Games
(Artificial Opponents available on Internet Server)



And with 11 traditional board games to choose from, you won't run out of ways to take advantage of it. Using our real-time voice chat, you can actually hear your opponent groaning in defeat on the other side of the world! With 2 CD-ROMs included inside, just give one to a friend to play games the way they were meant to be played... person to person.

The Classic Collection

- 11 Internet Playable Traditional Board Games
- 2 CD-ROMs, one for you, one for your friend.
- Multimedia Tutorials for each game.
- Real-time Voice Chat over the Internet while you play.
- Play on a Private Internet Connection or a Local Area Network

Enter The Rising Sun
Go, Renju, and Gomoku
Gold Seal Winner of the
Oppenheim Toy Portfolio

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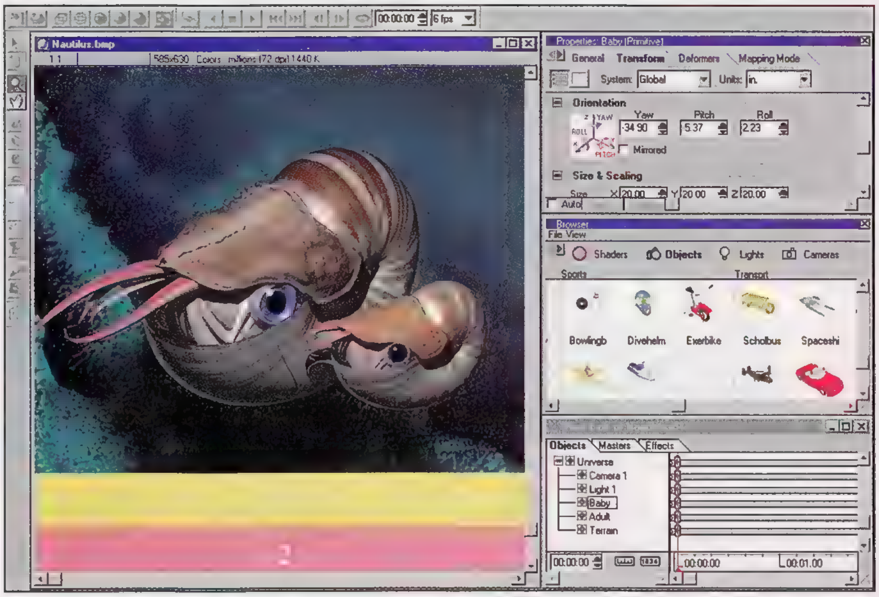
Product Information Number 186

Ray **Dream** Studio 5

3D modeling, rendering and animation for cheap

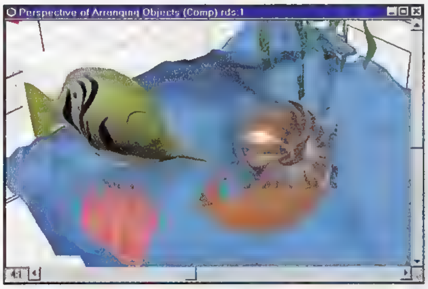


You won't likely find a better cross-platform 3D application that does it all for under $300.

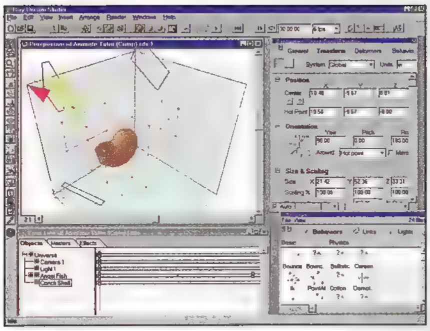
Using new MMX, OpenGL and multi-processor support, MetaTools' *Ray Dream Studio 5* delivers a rendering engine that's greatly improved over prior releases. If you have an MMX processor and OpenGL video card, you'll likely see a two-fold performance increase.

You'll find all the tools here to create and animate 3D objects. There are even a couple of high-end features that aren't found in other similarly priced packages. Along with Boolean operations and inverse kinematics, you'll find a new mesh form modeler with an accurate building control that lets you deform wire frames by pushing and pulling on them. The software also has improved animation capabilities for altering physically based behaviors such as collision detection and gravity.

What sets *Ray Dream* apart from Caligari's *TrueSpace,* its closest competitor, is an incredibly low street price. It also has better color support and shaders, as well as support for seamless file integration between Win and Mac versions. The folks at MetaTools say this version of *Ray Dream* has significant rendering enhancements for effects such as lens flare and depth of field. Under our tests, these enhancements didn't measure up to the speed and performance of *TrueSpace.*

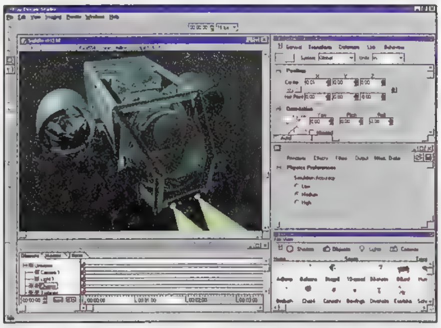


Using an MMX-happy Pentium II processor can chop your rendering times to mince meat.



Modifying your object's behavior, position and orientation is handled through an intuitive interface.

Ray Dream includes a good selection of environmental primitives such as Fountain, Fog, Cloud, and Fire. And, if you're a real left-brained thinker, you can create primitives from scratch by inserting your own complex mathematical computations. The software supports a generous variety of file types, including BMP, *Painter*'s RIFF, TIFF, PCX, *Photoshop*'s PSD, JPEG, and TGA. And you can import 2D shapes from vector-based applications such as *CorelDraw* and Adobe *Illustrator.*



Control palettes a-plenty, but, fortunately, a modeling wizard helps guide you through difficult waters.

Non-animators will be pleased with *Ray Dream*'s Modeling Wizard, a modeling for dummies utility that guides you through every step of the modeling process. You can choose a primitive and define its parameters, and the program will automatically draw it without requiring you to wade through numerous dialog boxes.

While *Ray Dream's* features are indeed impressive for such a relatively inexpensive application, there are problems. First, the sample files are weak. If the developers didn't have time to create a good tutorial, they should have hired someone to do it for them. Several routines, such as dragging files into the Time Line Window, assigned incorrect names to the icons; case-sensitive operations weren't noted as such in the documentation; and dragging the production frame by shift-clicking didn't perform correctly.

Ray Dream is easy to learn, and comes with 750 pre-made models from Viewpoint Datalabs and Acuris. Version 5.0 is a significant improvement over the previous version, but MetaCreations still has a way to go before this application becomes a necessity in everyone's toolbox.

—Rick Popko

Price $295 ($99 Upgrade)
Developer/Publisher
MetaCreations
Phone 800.566.6200
URL www.metacreations.com

boot verdict
7

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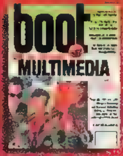

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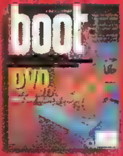

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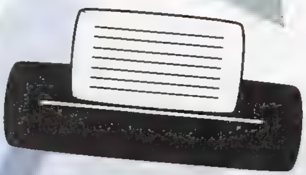

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Diamond Audio S2 HPM4100 & HPM4060

Bass makes all the difference

Acoustic connoisseurs, are you hungry for a three-piece subwoofer/satellite steak with all the fixings? We hope you are, 'cause Diamond Audio is serving up a tasty sonic sensation with its S2 multimedia speaker systems.

The $600 menu price for the top-of-the-line HPM-4100 says these speakers aren't for the indiscriminate palette. Before we get into the differences between these dishes, let's talk about what they share: The first common elements are the HPM-2000 two-way satellite speakers. Each die-cast ellipsoidal beauty holds a single 4.5-inch treated-paper midrange driver—complete with inverted-dust cap and Neodymium magnet—and a lone poly-aluminum dome tweeter handling all the high frequencies. A metal grill protects the drivers, while an optional DS-1 rubber desktop stand angles each satellite for proper imaging.

The second common ingredient is the ingenious Control Module, a pre-amplifier box that puts control at your fingertips, from volume, loudness, bass, treble and input selection, to Diamond's 3D sound processing. The Control Module either sits pretty on your desk, or mounts inside a free 5.25-inch drive bay, with a 9-pin serial cable-esque S2Bus stretching between the module to the subwoofer box (both internal and external cabling is supplied).

Now let's see what a difference $150 makes.

—Andrew Sanchez

Despite the hefty MDF subwoofer box and great low-volume output, the HPM-4060's woofer couldn't hang with the big beats.

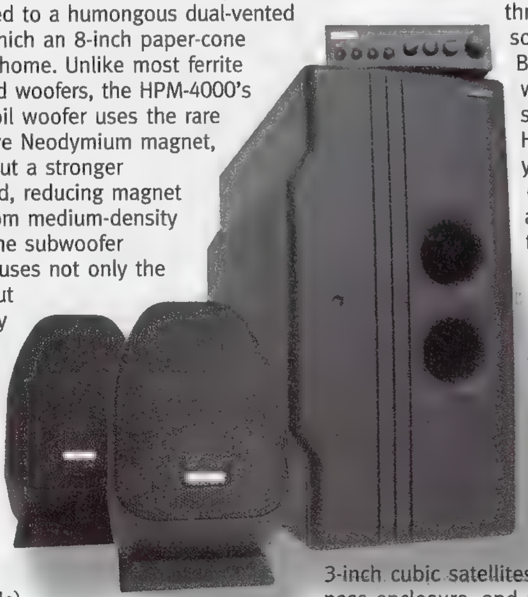
boot KICK ASS! PRODUCT

HPM-**4100**

When an 8-inch subwoofer and some of the cleanest-sounding satellites get together for harmony, you better be hungry because the S2 HPM-4100 is a four-course banquet filled with sumptuous sounds.

The system is comprised of the HPM-2000 satellites and Control Module pre-amplifier wired to a humongous dual-vented enclosure, which an 8-inch paper-cone woofer calls home. Unlike most ferrite magnet-based woofers, the HPM-4000's dual-voice coil woofer uses the rare and expensive Neodymium magnet, which puts out a stronger magnetic field, reducing magnet size. Built from medium-density fiberboard, the subwoofer enclosure houses not only the subwoofer but also the hefty 100W three-channel amplifier that pumps 50W to the bass and 25W to each satellite. The active (but non-adjustable) crossover filters pre-amplified signals at 150Hz between the subs and satellites, while a passive 4KHz crossover keeps the mids from tweeting and vice-versa.

Two gold-plated RCA inputs and dual 1/8-inch mic inputs also dot the speaker box, alongside an ill-placed power button.



Hide the children and pets—the HPM-4100 explodes with the ferocity of an atom bomb.

The HPM-4100 is a joy to listen to. That single 8-inch woofer puts serious rumble under your desktop, going down to 35Hz smartly before rolling off. With the bass boosted to three-quarters, you can coax subterranean frequencies into the 15Hz region—but be careful, lest you overdrive the woofers into oblivion. Everything we threw at the speaker sounded awesome. Big bass is nothing without swooning satellites, and the HPM-4100 satisfies all your needs. Cymbal crashes are sharp and defined, while the midrange handles everything thrown at it with no audible distortion or harshness. The poly-aluminum tweeters, in particular, are crispy, clean and sharp.

These speakers are expensive, but they can go toe-to-toe with Cambridge's mighty MicroWorks 3-inch cubic satellites and band-pass enclosure, and put up an excellent fight.

***Price** $600*
***Company** Diamond Audio Technology*
***Phone** 310.582.1121*
***URL** www.diamondaudio.com*

boot verdict 9

HPM-4060

The HPM-4060 is Diamond's Blue Plate special. The dollars saved by sacrificing the larger 8-inch woofer for a smaller 6.5-inch woofer just don't justify the dramatic drop off in bass response.

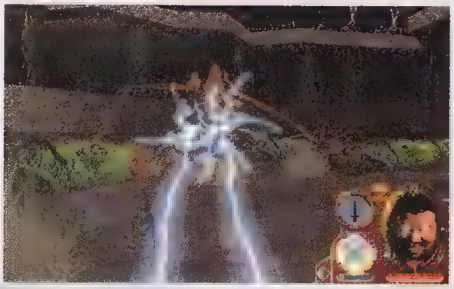
Packing the exact same satellites and Control Module pre-amp of the HPM-4100, the big difference lies in the 6.5-inch long-throw woofer that resides in the dual-vented ported enclosure. The system packs less power, with a 60W three-channel amplifier providing 30W to the sub and 15W for each satellite.

When pushed to its limits, the biggest sonic flaw with the HPM-4060 is the lowly 6.5-inch woofer. Bass output from 40Hz on up is strong, but when low-frequency equalization is pushed anywhere pass the center detent, the woofer bottoms out horrifically, with popping noises emanating from the enclosure. Mostly all of our tests that bomb the bass at 35Hz and below had the poor thing flailing away.

Given the choice, you're best bet is splurging for the extra $150, and getting what your ears truly deserve.

***Price** $450*
***Developer** Diamond Audio Technology*
***Phone** 310.582.1121*
***URL** www.diamondaudio.com*

boot verdict 7



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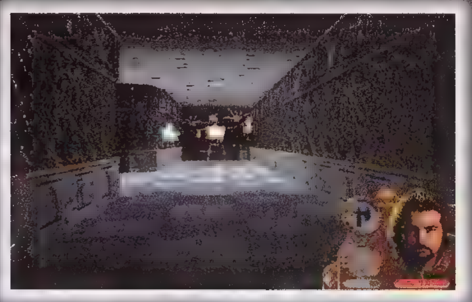
GUARDIANS OF DESTINY™



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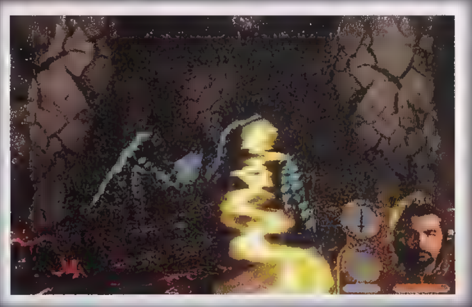

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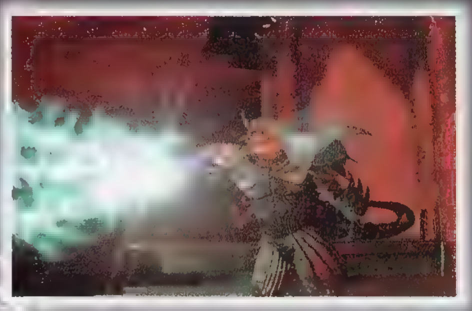
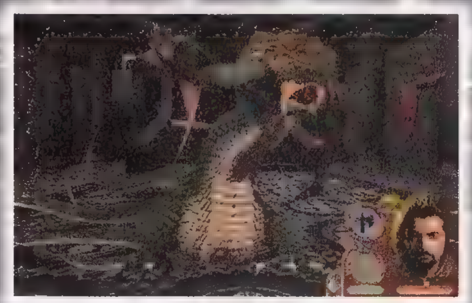


FULL SCREEN 256 COLOR HIGH RESOLUTION GAME PLAY



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Westwood™ STUDIOS

www.westwood.com

RATING PENDING RP CONTENT RATED BY ESRB

Product Information Number 361

Call 1-800-771-3772 for Game Rating Information

Microplex **NetworkEye**/270-Color v1.1

Your eye in the sky

If you want the entire world to know what you're doing every minute of every day, you hook up a web cam. But what if you don't want to devote a PC to the task? You hook up the Microplex NetworkEye/270 (aka NE-C). This little box is a Connectix Color QuickCam controller and HTTP image server all in one.

At a mere 4.4x1.1x3.7 inches, and weighing less than half a pound, this unobtrusive box makes the ultimate spy cam, supporting both single and animated images in JPEG format, or via a JAVA application class.

To get up and running, simply plug the camera into the back of the NE-C and plug an RJ-45 10Base-T Ethernet cable in the front. Now assign an IP address with the included utility, or use ARP, RARP or BOOTP. All other configurations are accomplished via WWW, Telnet, FTP, or TFTP (required to update the flash BIOS) using standard network protocols and ports.

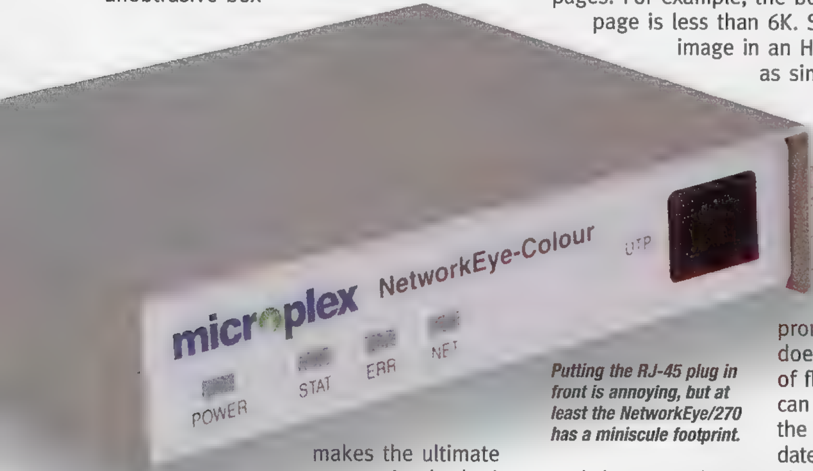
Web pages then FTP into the box's 63K storage area. This might not seem so spacious, but it's enough to hold most WWW pages. For example, the bootLive.html page is less than 6K. Setting up the image in an HTML page is as simple as copy and paste. Configuring image size and picture quality is done via the WWW GUI to the NE-C.

This oh-so promising premise does have its share of flaws. Static text can be overlaid on the image, but not date or time stamps. And the text color can't be changed from the illegible default gray. The RJ-45 jack should have been positioned on the back of the box rather than the front, and extending the box's width by half an inch would have eliminated the annoying dangling Ethernet connection. Finally, to reset the root password you must unplug everything, remove eight screws, open the case, set a jumper, plug it all back together, load up the WWW page, set the password, unplug everything, and finally remove the same jumper all within three minutes. This military gun-cleaning maneuver is way overboard, considering a toggle switch could have easily been placed on the unit's bottom.

And the price seems a bit steep for such a limited product. It only works with one specific model of camera, and requires its own dedicated (and precious) IP address, something many people don't have to spare. It seems that for the same price, an old 486 system could be used to serve images among other things like files and printers.

Still, the NetworkEye/270 is small and reliable, plus it's the only self-contained web cam option currently available.

—*Daevid Vincent*



Putting the RJ-45 plug in front is annoying, but at least the NetworkEye/270 has a miniscule footprint.

Price $595
($395 without camera)
Company Microplex Systems Ltd.
Phone 800.610.4847
URL www.microplex.com

boot verdict 5

Web**Snake**

Ssssearch the web

TRY IT ON THE DISC

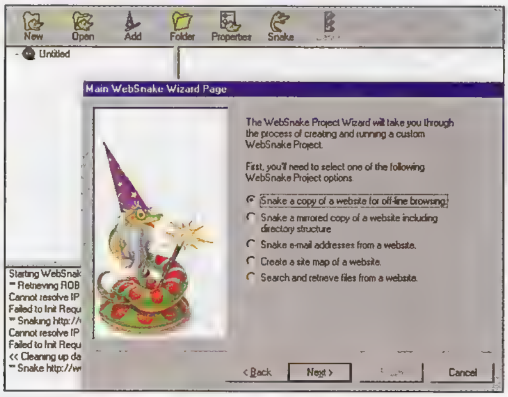
WebSnake slithers in to combine offline web browsing with advanced search and filter features.

Beyond the standard "go-to-this-URL-and-get-this-many-pages-with-these-kinds-of-files" business, *WebSnake* can search and retrieve only those pages containing a particular keyword (great for text archives that aren't otherwise searchable), and create maps of sites.

In addition to standard layer limits, file type limits, and size limits, *WebSnake* filters by domain, and bars paths containing specified characters. It can obey the Robot Exclusion Standard (although this greatly bogs down the program), and identify itself to nosey servers as whichever browser you wish.

Once pages are downloaded, *WebSnake* displays a list of pages on a three-panel screen vaguely reminiscent of Netscape's mail reader. Double-click a listed page, and it pops up in the browser of your choice. Downloaded files load quickly and are integrated cleanly; your browser won't stutter moving between a downloaded page to an online page. Best of all, the program is extremely hearty: We set it to searching an online text archive and left. When we came back an hour later, *WebSnake* was still chugging away after piling up over 3,000 searched pages. Ssssuper!

—*Tara Calishain*



The WebSnake Project Wizard will take you through the process of creating and running a custom WebSnake Project.

First, you'll need to select one of the following WebSnake Project options.

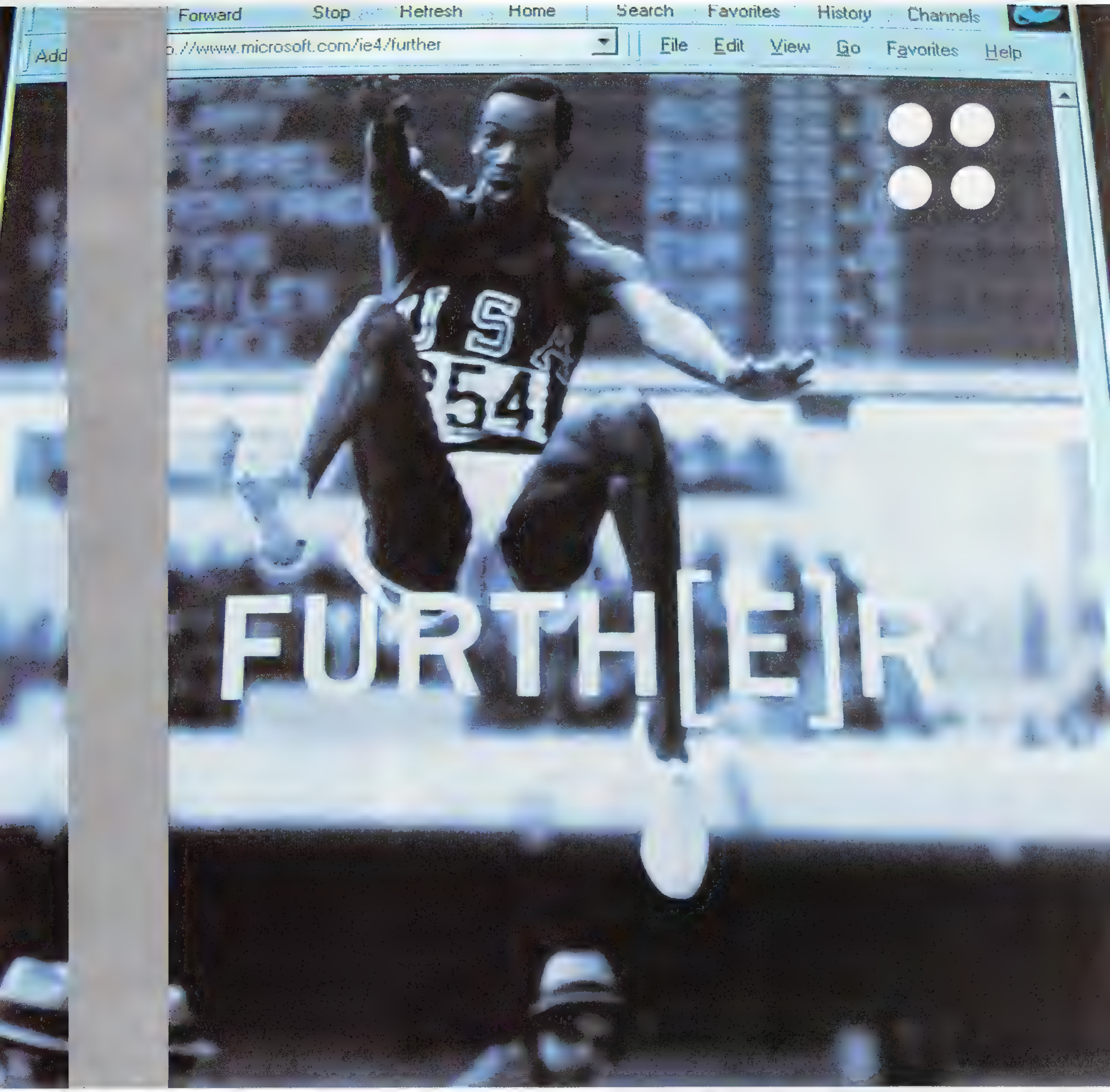
● Snake a copy of a website for off-line browsing
○ Snake a mirrored copy of a website including directory structure
○ Snake e-mail addresses from a website.
○ Create a site map of a website.
○ Search and retrieve files from a website.

```
Starting WebSnak
— Retrieving ROB
Cannot resolve IP
Failed to Init Requ
— Snaking http://
Cannot resolve IP
Failed to Init Requ
<< Cleaning up da
— Snake http://w
```

WebSnakes cute snake motif may get annoying but the project editor fully rocks.

Price $30
Developer/Publisher Anawave Software
Phone 714.250.7262
URL www.anawave.com

boot verdict 9


Forward
Stop
Refresh
Home
Search
Favorites
History
Channels
Add
p://www.microsoft.com/ie4/further
File
Edit
View
Go
Favorites
Help
USA
554
FURTH[E]R

Nomai **750.c**

Talkin' all that jaz

Can a removable Winchester drive survive in the age of Jaz? Nomai hopes so, and the 750.c is its bid to revive Syquest's weathered storage standard.

Filling the void between Iomega's 100MB Zip drive and 1GB Jaz drive, this tough little black beauty supports four capacity sizes of 3.5-inch media: its own 750MB and 540MB cartridges, as well as Syquest's old 270MB and 135MB cartridges.

Sporting a 512K cache buffer, the external drive is only 4.25x7x1.25-inches, and is housed is a sturdy steel casing. Dual DIP switches in the rear control active termination and SCSI address 1 or 5 (address 5 also configures the drive for soft address selection). A 25-pin female SCSI-2 interface and power connector round also lurks back there. For interfacing duties, Nomai chose AdvanSys' ABP-930 PCI SCSI host adapter. Three pieces of media, and the necessary cables and connectors are also included, although the beefy power brick makes for a tight squeeze on your power strip.

Nomai also has an internal drive bay for the 750.c. Unlike Exabyte's Eagle Nest, this drive nest is made from steel. Once the nest is installed, slide in the 750.c, and you're ready for some internal duty. A simple pull of the level pops the 750.c back out, for easy storage and transport.

The software bundled with the 750.c include the necessary device drivers for the AdvanSys card, as well as Nomai's configuration program that allows changes of SCSI address via software.

When put through the paces, the 750.c performs as advertised, taking 6.88 seconds for a full disk format. But toss in the thorough ScanDisk, and you'll add a whopping 21 minutes 39 seconds to your format time. The package proves very capable of streaming video off its cartridge with no detrimental effects to visual or aural performance (our test 320x240 AVI and MPEG-1 files dropped no frames and exhibiting no jitters or audio drops). Copying 38.7MB of files from the hard drive to the 750.c took 28 seconds. Adaptec's ThreadMark reports the 750.c/AdvanSys combo attains an average transfer rate of 1.24MB/sec.

The Nomai 750.c is barely bigger than its media.

As removable drives go, Nomai's 750.c is up to the challenge of unlimited storage space, but with everyone doing the Jaz thang, it'll be harder for this medium to ever become the standard.

— Andrew Sanchez

Dare to Compare

Which media size and pricing is best for you? Take a peek and compare for yourself.

Drive	Capacity	Price of media	Price per MB	Drive (Int)
Nomai 730.c	730MB	$70	10 cents	$240
Iomega Jaz	1024MB	$99	10 cents	$400
Syquest SyJet	1536MB	$125	8 cents	$400
Iomega Zip	100MB	$20	7 cents	$150

Price *$299; Internal PC kit $40; 750MB media $70; PC SCSI card kit $160*
Company *Nomai*
Phone *888.99.6624*
URL *www.nomai.com*

boot verdict 8

VersaPoint **Wireless** Keyboard

Damn Annying, Dops a Lotof Chaacters

Wireless keyboards rock. In fact, we made the Sejin FreeBoard Beamer reviewed two months ago a permanent fixture in the bootLab. We know how a wireless keyboard should perform, so it's safe to state the VersaPoint Wireless Keyboard sucks big-time.

The VersaPoint Wireless Keyboard's sleek shape will come in handy as it sails through the air towards the trash. Notice the annoying placement of the right shift key, and the lack of home, end, page up, and page down keys.

If you try to use the VersaPoint for writing tasks, you'll give up after just a paragraph of countless dropped characters. And that's with the sensor mere inches away from the keyboard; it performs no better when used across the room. At least the range is decent. Interlink claims an average range of 50 feet, and a battery life of a year, and our distance tests support this. The supported range of angles is rather limited, however, since the transmitter on the keyboard only fires out the front. There are no side-firing IR windows.

The keyboard's ergonomics leave a lot to be desired, as well. There are no Windows keys, and the commonly used PgUp, PgDn, Home, and End keys can only be accessed via the Fn key. The right Shift is placed outside the up-arrow, resulting in accidentally moving up a line nearly every time you shift. The integrated touchpad is below average in accuracy and ease-of-use when compared to the latest laptops, and the included stylus provided for "added accuracy" will quickly be lost, given there's no way to store it within the keyboard.

There is absolutely no-reason to recommend this keyboard over the excellent Sejin FreeBoard Beamer.

— Chris Dunphy

Price *$159*
Company *Interlink Electronics*
Phone *800.340.1331*
URL *www.interlinkelec.com*

boot verdict 1

Further:: Microsoft® Internet Explorer 4 is a new breed of browser. One where information from your favorite Web sites is automatically downloaded and delivered whenever you want it and where you want it (like right on your desktop). Where channels aren't just channels – they're Active Channel™ Web sites, preset and packed with exclusive content and produced in Dynamic HTML, so you can see all of the rich, interactive content faster. Where Windows® and the Internet speak the same language, so you don't have to shift gears and waste time switching between different applications and the Internet. Where you can run Java™ applications faster. And the world is a happy place where people smile and hold hands and sing songs about rainbows and free software. Get the Web the way you want it. Download Internet Explorer 4 now. It's free.*

www.microsoft.com/ie/

Where do you want to go today?™

Internet Explorer 4

Microsoft

To get Microsoft Internet Explorer 4: Download it free from the Web or order a CD, for $4.95, from the Web or at 1-800-485-2048. *Connect-time charges may apply when downloading. ©1997 Microsoft Corporation. All rights reserved. Microsoft, Windows and Where do you want to go today? are registered trademarks and Active Channel and the Microsoft Internet Explorer logo are trademarks of Microsoft Corporation. Java is a trademark of Sun Microsystems, Inc. And thanks to Bob Beamon™, who jumped to a world-record 29'2.5"™ on October 18, 1968.

Toshiba **Satellite** Pro **460**CDT

Short end of the stick

Timing is everything.

Had the Satellite Pro 460CDT arrived in the bootLab a scant three weeks earlier, it might've satiated our hunger for a good notebook. Unfortunately, the 460CDT had the misfortune of arriving mere days after we had reviewed two of the best notebooks imaginable—Gateway's Solo 9100 (*boot* 13) and Micron's Transport XKE (*boot* 14). Head-to-head comparisons are inevitable, and the 460CDT ends up on the short end of that stick.

On paper, there aren't many differences between the Solo 9100 and the 460CDT. Both incorporate Intel's mobile Pentium 166MHz MMX processor, and both use the exact same video and audio subsystems (although the Solo's video is augmented by an additional 2MB of memory). But while specs tell one story, real-world performance tells another. Even with 32MB of EDO DRAM, the 460CDT's performance pales in comparison. Big time.

The bootMark bar charts provide ample evidence of what's wrong with the 460CDT: The inflated processing times, diminished frame rates, and middling transfer rates barely equal the performance of a typical 150MHz notebook equipped with a mere 16MB of RAM. Ouch. The only saving grace is the CD-ROM drive, which managed to cough up a respectable 1418K/sec. transfer rate.

Part of the performance problem for the 460CDT is its glut of pop-up utilities. The biggest culprit—the Toshiba Access Panel, a compilation of various system settings—drains massive processor power. With TAP on, the 460CDT scored a bootMark of only 32.6. With the TAP turned off, the 460CDT scored a bootMark of 36.

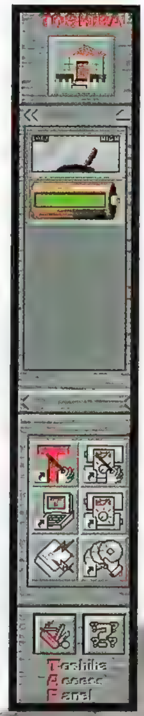
The video subsystem is good, but nothing to get sweaty about. Toshiba scrimped on video memory, and with only 2MB of onboard EDO DRAM, the 460CDT had problems with MPEG and AVI playback. Frame rates were good during full-screen MPEG playback, but images were chunky. AVI fared worse—more than 75% of our 1700 test frames dropped during playback. The 12.1-inch (but only 800x600) display is a dandy, however, with superior off-axis viewing and zero flex.

Storage-wise, the 460CDT is a mixed bag. Although the hard drive posted acceptable transfer rates, the Lilliputian capacity left us wanting. (Only 2GB? Most of this fall's mobile PCs have 3GB minimum.) Audio controls on the front of the CD-ROM drive, including a rotary volume control, are a nice detail.

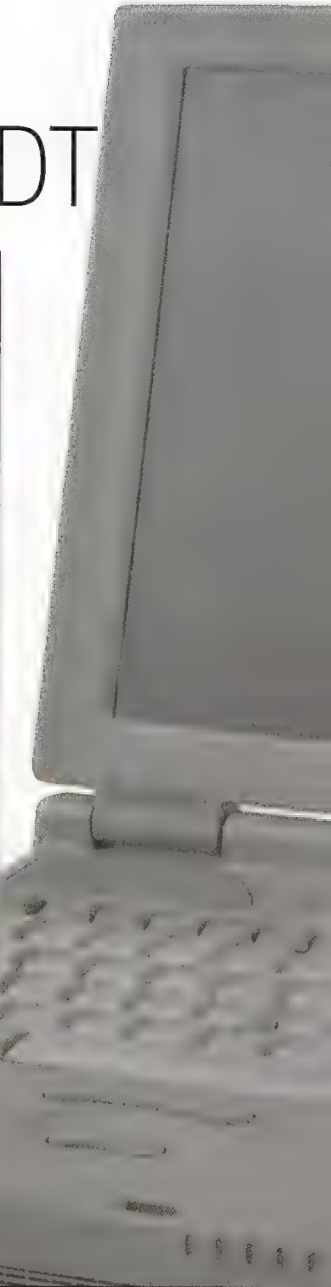
Given the sub-$4,000 price, we were hoping performance shortcomings might be mitigated by size and weight, but with a carrying weight of more than nine pounds, they're clearly not. And even then, the 460CDT is still missing features, including TV-out capability, and a PC gameport. Blah.

Except for the price, there just isn't a lot to recommend.

—*Bryan Del Rizzo*

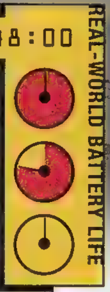


BUD ON TAP
The Toshiba Access Panel, a compilation of a bunch of Windows utilities, pops up whenever you cursor over to the right side of the screen. But keeping it active eats up precious CPU processing power. Ouch.



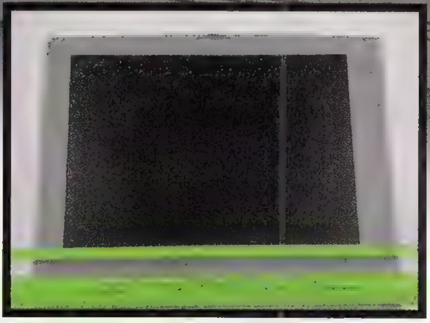
under the hood

THE BRAINS	
CPU	Intel Pentium 166MHz
L2 Cache	256K pipeline burst
RAM	32MB EDO DRAM (160MB maximum)
Video	Chips & Technologies CT65554 (2MB EDO DRAM)
THE BRAWN	
Hard Drive	Toshiba 2.0GB
CD-ROM	Toshiba 10x
Expansion Bus	Two Type II; One Type III; CardBus and Zoomed Video compatible
Ports	Floppy disk drive; one USB; one PS/2; one parallel; one serial;
Lap Weight	7 lbs., 1 ounce
Carrying Weight	9 lbs., 1 ounce
THE BEAUTY	
Display	12.1-inch active-matrix screen
Sound	OPL3-SA FM/software-wavetable
Video	800x600 (1280x1024 video out), 8-bit color (virtual desktop)
Speakers	Stereo
Communication	33.6Kbps voice/data/fax modem; cellular connection; IrDA port

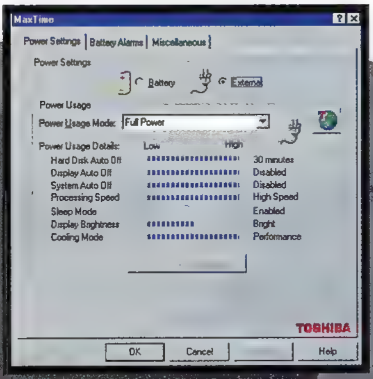


THE BUNDLE Indeo Video I Mediamatics Arcade Pak I Puma TranXit I Sony Music Screeners Screen Savers I MaxTime I Fn-Esse I magiCDisc

boot :63 **down** :04



LEFT BRAIN-RIGHT BRAIN = WHAT A PAIN
Hmm... another off-centered screen. Can you say "conspiracy theory"?



MaxTime

Power Settings | Battery Alarms | Miscellaneous

Power Settings

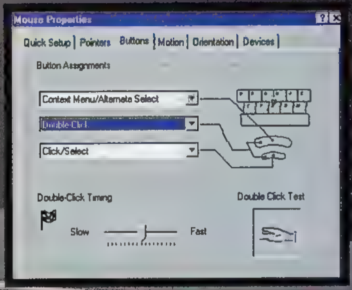
○ Battery ● External

Power Usage

Power Usage Mode: Full Power

Power Usage Details:	Low … High	
Hard Disk Auto Off		30 minutes
Display Auto Off		Disabled
System Auto Off		Disabled
Processing Speed		High Speed
Sleep Mode		Enabled
Display Brightness		Bright
Cooling Mode		Performance

POWER MONGER
The customizable power management settings are sweet. You can independently adjust settings for the audio sub-system, disk drives, and PC Cards plugged into the system.



Mouse Properties

Quick Setup | Pointers | Buttons | Motion | Orientation | Devices

Button Assignments

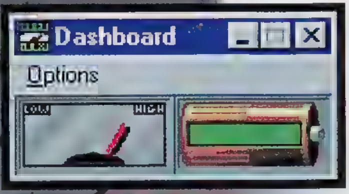
Context Menu/Alternate Select
Double-Click
Click/Select

Double-Click Timing

Slow … Fast

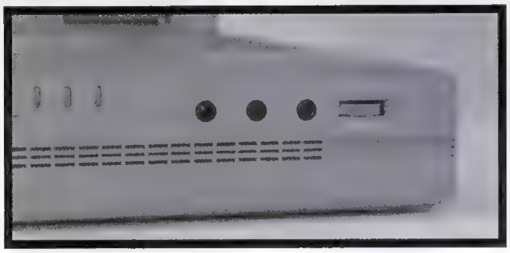
Double Click Test

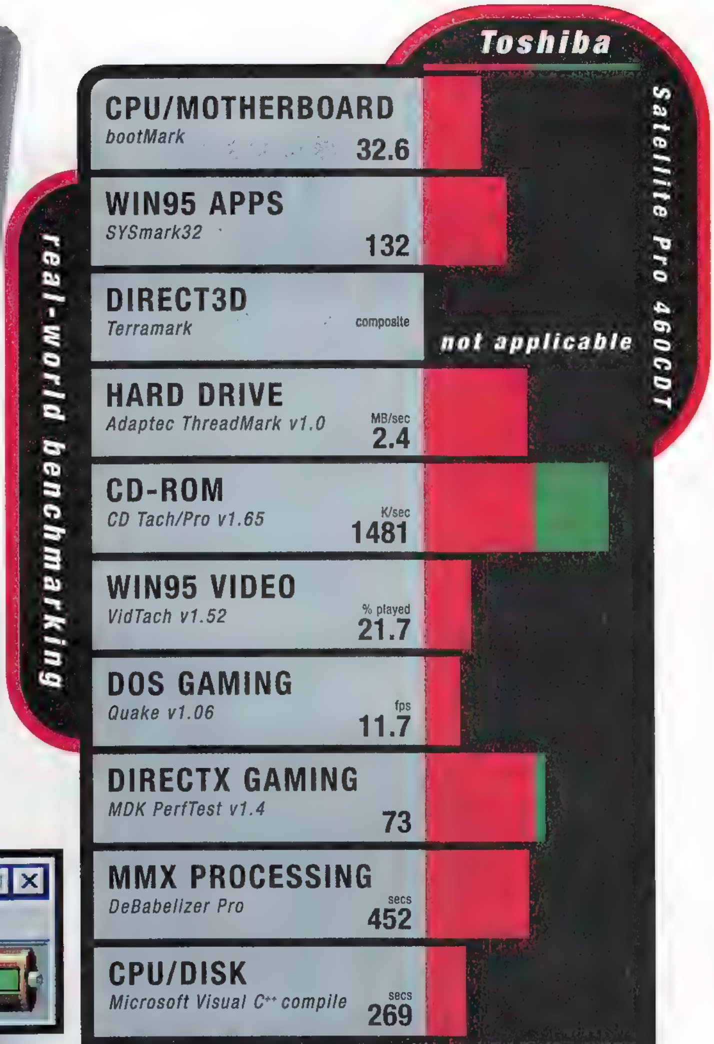
TASTY MOUSE MORSELS
Another nice touch: customizable mouse settings. If you find the default button settings to be a pain, take a quick visit here, and you'll be sitting pretty.



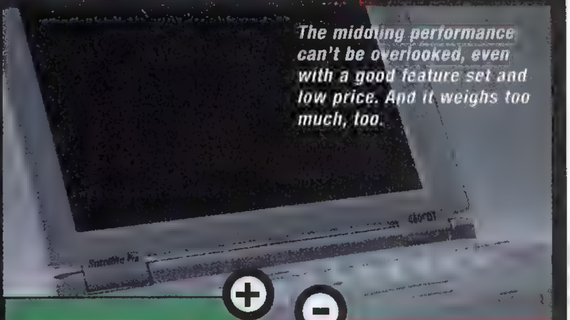
[illegible]
The Dashboard, yet another pop-up utility, provides an alternate way to view battery life and power status.

AURAL STIMULATION
Front audio controls, including an analog volume control, are appreciated, as is the built-in 33.6Kbps modem and cellular connection.





Test	Benchmark	Unit	Toshiba Satellite Pro 460CDT
CPU/MOTHERBOARD	bootMark		32.6
WIN95 APPS	SYSmark32		132
DIRECT3D	Terramark	composite	not applicable
HARD DRIVE	Adaptec ThreadMark v1.0	MB/sec	2.4
CD-ROM	CD Tach/Pro v1.65	K/sec	1481
WIN95 VIDEO	VidTach v1.52	% played	21.7
DOS GAMING	Quake v1.06	fps	11.7
DIRECTX GAMING	MDK PerfTest v1.4		73
MMX PROCESSING	DeBabelizer Pro	secs	452
CPU/DISK	Microsoft Visual C++ compile	secs	269



The middling performance can't be overlooked, even with a good feature set and low price. And it weighs too much, too.

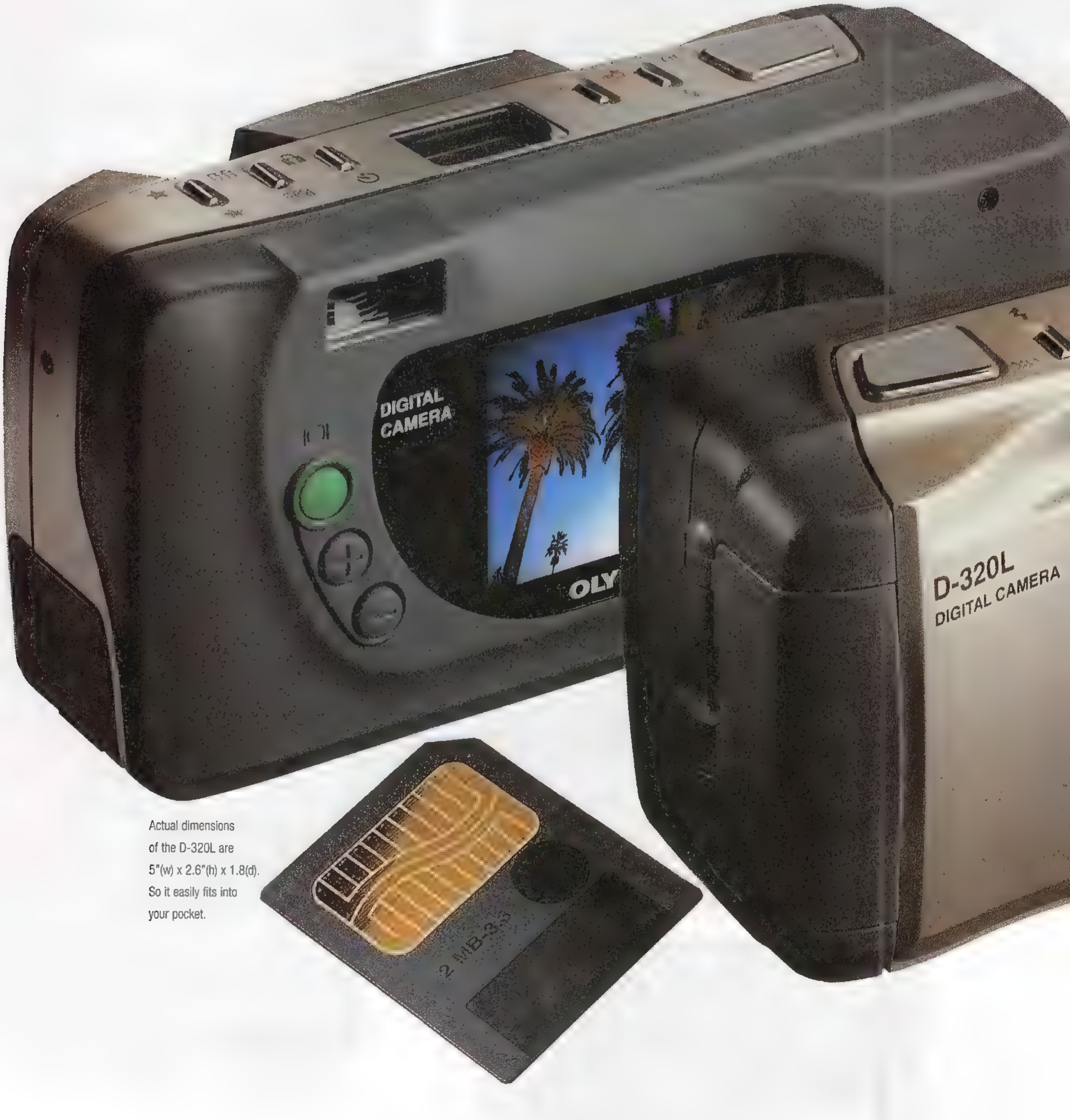
+	−
Pentium 166MHz	CPU-hogging TAP
Fast CD-ROM	Mediocre performance
Excellent power management	No gameport
Built-in modem	Single PS/2 port
USB port	Diminuitive hard drive capacity
Front panel audio controls	Heavyweight
[illegible]	

Price *$3,899*
Company *Toshiba*
Phone *800.457.7777*
URL *www.toshiba.com*

boot verdict 5

A complete breakdown of benchmark results is available on the *bootNet.* Point your browser to www.bootnet.com

THE DIGITAL CAMERA FRONT TO BACK.


DIGITAL
CAMERA
OLY
D-320L
DIGITAL CAMERA
2 MB-3.3

Actual dimensions of the D-320L are 5"(w) x 2.6"(h) x 1.8(d). So it easily fits into your pocket.

WAY OUT FRONT

Let's begin with the optics that give Olympus its renown. Here the D-320L exceeds beyond all counts. It has a five element all glass aspherical F2.8 autofocus lens with macro. Quite simply, this lens is equal to the lenses on our award-winning 35mm cameras. Put another way, this digital camera consistently produces higher quality images than other digital cameras, even some with higher resolution.

Also worth mentioning: a four mode flash with red-eye reduction; auto white balancing; and manual exposure controls allowing you to compensate for light conditions.

WE WORK OUR PIXELS HARDER THAN ANYONE ELSE

Our resolution: never produce a high resolution camera without giving the pixels something to do. Our resolution is 1024 x 768 pixels and all 810,000 of them have plenty to keep them occupied. The key is our sophisticated imaging system: the multiple compression ratios that give you a choice of both image quality and size as well as the color management system that rewards you with rich, vibrant images. The result: every one of our pixels earn their keep.

OLYMPUS
OLYMPUS LENS
1:2.8 5mm

SHOOT, SHOOT, SHOOT

There are no restrictions on the number of photos you can capture with the D-320L. The 2 megabyte SmartMedia™ card that comes with the camera (4MB optional) has an unlimited capacity. You just simply download the images from the card to your computer by means of the serial cable or the optional PCMCIA or 3.5" floppy disk adapters. Or you can insert a new card anytime and keep on shooting.

Hook up the D-320L to the TV and watch your shots come to life.

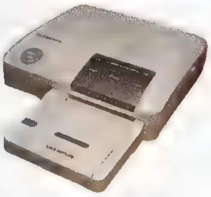
NO COMPUTER NECESSARY

For those who don't want to be married to a computer day after day, there's emancipation. The D-320L has video output that directly hooks to your TV. The entire family can now view your shots without the need for a computer. And the images can be videotaped on a VCR and sent to relatives or business associates.

Another direct connection is from the camera to the new Olympus P-300 personal photo printer. In a little over a minute you can print true photo quality images directly from the camera. Finally, digital independence!

OUR REVEALING BACK

It tells you a lot. For one thing, there's the new 2" screen that displays real images in brilliant color. You can use it as a viewfinder or to review your shots one at a time or nine at a time. Or use it to present a slide show by automatically displaying each image one at a time. And if stop action inspires you, the D-320L can capture 9 shots per second in a single frame.



Connect the camera to our photo printer and presto! Get the photo you want, when you want it.

A FEW FINAL BYTES

Note: our more economical D-220L, with a resolution of 640 x 480, is ideal for smaller images (snapshots, the web, electronic presentations) and still gives you all the features and image quality of the D-320L.

Note: last year's Olympus digital cameras won more awards than any other digital cameras. Just imagine what this year will bring.

We've exposed the digital camera front to back. Now you should see for yourself how rich and sharp our images really are. Visit us at www.olympus.com. Or call us at 1-800-622-6372 and we'll answer all your questions.

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Product Information Number 260

Logitech MouseMan+

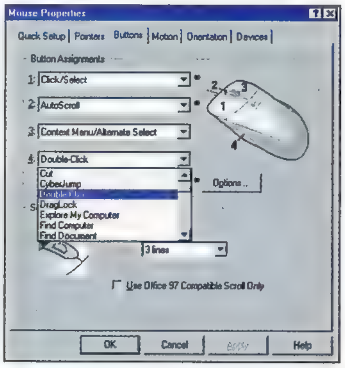
Not you father's pointing device

boot KICK ASS! PRODUCT

You need a mouse, no two ways about it. And the chintzy mouse that shipped with your PC won't last forever. Meet your next mouse.

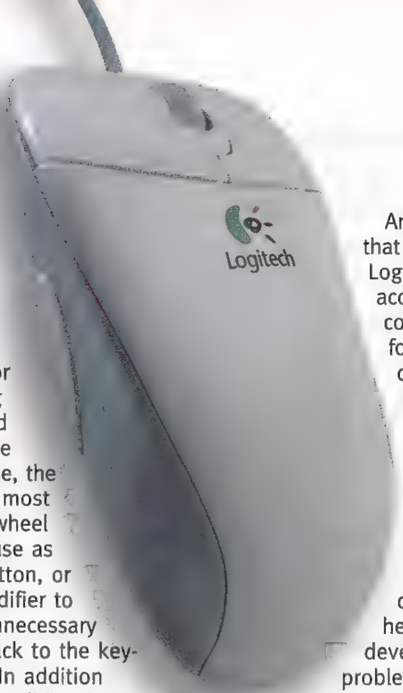
From the first moment you wrap your paws around Logitech's latest, you'll know: This ain't your father's pointing device. The ergonomic design cradles the hand and may even relieve medical conditions related to mousing around. This is the Barca Lounger of mice, as far as comfort is concerned.

And function doesn't stray far from form in this peripheral. Under the hood of this 400dpi powerhouse rumbles a suite of capabilities that shames all comers. The four-button design includes a rolling finger wheel for scrolling and zooming through interfaces and documents. And unlike Microsoft's Intellimouse, the MouseMan+ works in most any Win95 app. The wheel can be pressed into use as a standard middle button, or programmed as a modifier to save unnecessary trips back to the keyboard. In addition to the traditional right- and left-click buttons that straddle the scroll/zoom wheel, a fourth button is positioned under your thumb. This button can also be programmed for any of the 50 functions provided through the MouseWare control panel. Options include all the F-keys, nav keys, modifiers, and a slew of time-saving capabilities.



1: Click/Select
2: AutoScroll
3: Context Menu/Alternate Select
4: Double-Click
3 lines
☐ Use Office 97 Compatible Scroll Only

The MouseWare that ships with MouseMan+ makes programming your rodent a snap.



Dimpled surfaces let you get a grip on Logitech's new high-octane MouseMan+.

Among the unique options that can be assigned are Logitech's Hyperjump, for accessing common Win95 commands, and Cyberjump for popular web browsing commands, such as bookmarking, backing up a page, and going to a bookmarked site.

The PS/2 MouseMan+ also comes with a 9-pin serial port adapter on the end of it's 6-foot tether. While the device's construction appears hearty, our first prototype developed a connection problem in the right button after intense use. Luckily the shipping unit we re-tested seems much sturdier.

Heck, this mouse is worth upgrading to even if your current rodent is still alive and kicking.

—Brad Dosland

Price $50
Company Logitech
Phone 800.231.7717
URL www.logitech.com

boot verdict 9

AVM Apex

Not here, not now

Last year, the Apex would have lead the pack of high-quality, low-cost prosumer sound cards. Today, this ISA-based resource hog just doesn't measure up.

The Apex is a full-duplex plug-and-play card that supports DirectX 5.0, the forgotten Windows Sound System format, and something AVM calls "3D Sound," which sounds more like a home stereo enhancement effect. AVM also opted to include SoundBlaster compatibility, which is executed relatively well via the Kurzweil MA-1 GM chip. But no matter how you smell it, FM synth is still crap. Unfortunately, this SoundBlaster privilege costs you four I/O addresses, two DMAs, and two precious IRQs—and there's no way to disable the "feature."

The paths of the 1/8-inch output jacks are peculiar, too. The OUT jack sends only 20-bit 98db S/N Kurzweil audio, while the SPKR jack sends both digital audio and Kurzweil audio, but at a lower 16-bit 89db S/N fidelity (it should be noted we were hard-pressed to notice the sonic difference).

The 1/8-inch MIC jack can provide phantom power, while the IN jack is line-level with a S/N of 89db, as well. Odd, since both are essentially the same thing.

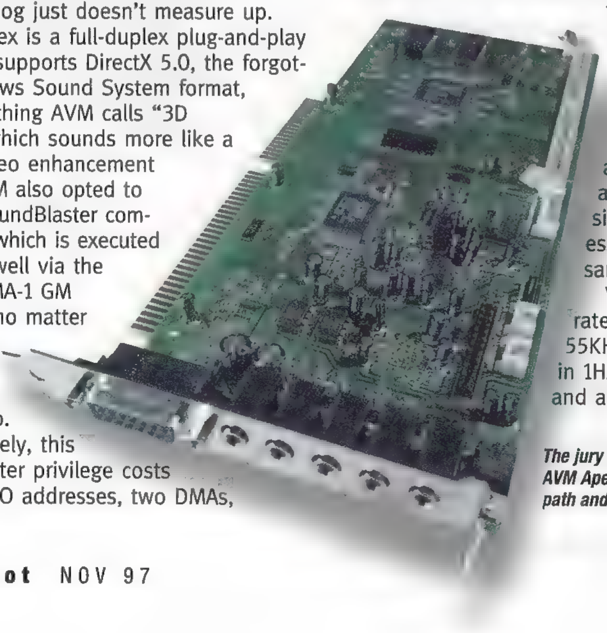
Variable sample rates from 5 to 55KHz are supported in 1Hz increments, and a pair of 72-pin 70ns SIMM slots can pack a whopping 64MB, except there's currently no way to upload WAV or KRZ files. AVM promises a downloadable sample upload/V.A.S.T. synthesis patch editor in the near future.

The Apex doesn't come with a MIDI cable. Figures.

Still, the board is architecturally compatible with the top-of-the-line Summitt SST, and a S/PDIF and AES/EBU Digital I/O daughter board is available for about $100. *Cakewalk Express SE v5.0* and *Cool Edit Pro LE* are bundled with the card, and a very informative 200-page manual covers all the software and audio terminology.

Here and today, though, the Apex can't compete with newer PCI-based cards sporting multiple I/Os. Especially at this price.

—Daevid Vincent



The jury is still out on the AVM Apex's un-uniform I/O path and SB compatibility.

Price $349
Company AVM Technology, Inc.
Phone 800.880.0041
URL www.avmtechnology.com

boot verdict 6

Saitek **X36** Flight **Control** System

Don't Take Off Without It

Like a certain breath mint, the X36 Flight Control System is actually two, two, two units in one: the X36 Control Stick, and the X35T Throttle/Rudder System. And even though it's one of the most cumbersome, complex, and challenging joysticks we've ever set up—even for the bootBoyz!—it's one of the very best performers.

Installation is easy enough (gameport and keyboard connections are necessary), but stupidly, the keyboard connector is of the ancient AT variety. Argh! And no PS/2 adapter is included. Double argh! The throttle plugs nicely into the back of the stick, but to use the throttle for mouse control, you'll need another 9-pin serial pass-through, which isn't included either. Triple argh! And if you're planning on using the throttle with a different joystick, be warned: You'll need a standard Y-cable. Take our advice, and stock up on PS/2 cables and adapters before even thinking about plugging this baby in.

You'll curse the cables snaking across the desk until you get airborne. Then they'll disappear from the scope.

With two four/eight-way hat-switches, three fire buttons, a trigger, and a launch button, the X36 has enough armor to satisfy even the most ardent fighter pilot. If not, there's also a sliding pinkie switch, which can be used independently or as a modifier for other buttons, effectively doubling programmable functions. The ABS-molded handle feels absolutely superb. You'll appreciate the grip and fluidity once you're airborne.

Not to be outdone, the arced throttle/rudder system is just as good. The X35T has all of the elements of a standard throttle, and more. Among the features are two rotary dials—useful for selecting weapons and radar modes; multiple detents (indicating idle and afterburner positions); a four-way hat switch; and a three-position mode switch that can be set for multiple game configurations or distinctive command sets within one particular game. The crème of the crop, however, is the built-in rudder control, which is smartly located on the underbelly of the throttle.

The Win95 programming interface is good, but not great. If you're a flight jockey who likes complete, customized control, be prepared for some frustration—a programming manual isn't included, and the help file was M.I.A. It's easy to feel overwhelmed at the prospect of assigning and remembering up to 250 different game commands, but since there are about 20 control sets already included, you should be up in the air in no time.

— *Bryan Del Rizzo*

The X36 programming interface isn't pretty, but it gets the job done. You can assign different layered keystrokes for button press and button release.

Price $100
Company Saitek
Phone 310.212.5412
URL www.saitek.com/

boot verdict 9

Nintendo **3D1** Joystick

It's Good For Fencing

With an inflated price, no programmability, and a profound lack of features, the 3D1 joystick/ throttle is a dismal failure from top to bottom.

The handle—resembling a scimitar—is so uncomfortable to use for big and small hands alike, you'll wonder if the designers gave ergonomics any consideration at all. The plastic seams in the handle will rub your knuckles raw, and the buttons are in impossible-to-reach positions.

The 3D1 operates in three modes: CH Flightstick (or Flightstick Pro), ThrustMaster FCS, and Arcade Mode—but the throttle feature only works with the CH setting. A switch on the bottom of the base toggles between the settings. The "3D" in 3D1 refers to the Z-axis, or twist control, for rudder or turret control games (e.g., *MechWarrior 2*). Although the 3D1 has eight buttons, only the four on the handle (including the trigger) can actually be used for game commands. The four on the base only act as turbo-fire modifiers.

The Arcade Mode is just plain weird. Instead of using a real gamepad, Nintendo would rather you use the four buttons on the base for action, and the handle for movement instead. Truly bizarre and completely unintuitive.

As for performance, there isn't any. Diagonals were difficult, and with the Z-twist active, it's impossible to move the stick in any direction without affecting the play of the rudder. The 3D1 doesn't even come with its own dedicated Win95 drivers, and since it's not programmable, you can't re-map any of the buttons.

Pathetic.

— *Bryan Del Rizzo*

An anomaly: in MechWarrior 2, the twist control worked backwards—while twisting left, the turret moved to the right. Oops!

Price $60
Company Nintendo
Phone 888.229.2118
URL not active

boot verdict 1

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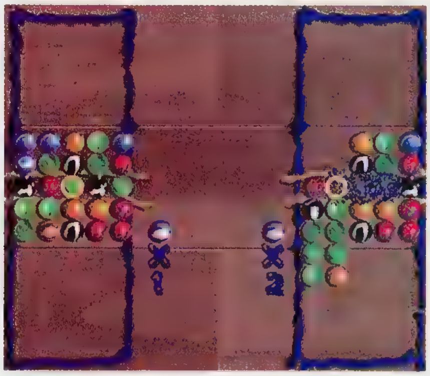
Lose Your **Marbles**

TRY IT ON THE DISC

Shades of Tetris

Segasoft has taken a simple idea and come up with an addictive game that will keep you playing into the wee hours. The premise is easy: Line up marbles of the same color to make them disappear. The game's AI is deceptively easy to beat at first; you'll breeze through the first levels. But around level three the AI turns nasty. Or you can play against another person, either on the same computer or via LAN.



If you get to this level, you're doing pretty well.

The pre-rendered backgrounds are crisp, clear, and brightly colored, while the sprite-based marbles are beautifully detailed. The game only runs in 640x480, but the graphics are so colorful you won't notice that it's only 8-bit. Plus it runs smoothly on any Pentium with DirectX.

One of the game's strongest attributes is the incredible Direct3DSound music. Each level has its own MIDI song that builds with the game's intensity.

Technically, the game doesn't have anything we haven't seen before, but *Lose Your Marbles* is an addictive little time-waster that does what it does well.

—Paula Reaume

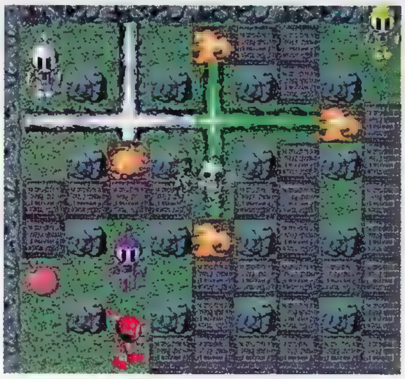
Price $20
Developer/Publisher Segasoft
Phone 888.734.2763
URL www.segasoft.com

boot verdict 7

Atomic Bomberman

What bombs at midnight

One of the greatest games of all time, *Bomberman,* finally finds a home on the PC. This latest incarnation continues the frantic and vindictive gameplay with up to 10 players competing via IPX, modem, or even all on the same machine via linkable game pads. The premise? Drop a bomb in the seat of your opponents' pants and run like hell. The gamut of creative power-ups and maps makes *Bomberman* endlessly replayable.



Dramatic death scenes make Bomberman a blast.

The graphics in *Atomic Bomberman* are underwhelmingly modest at 640x480. Still, the pre-rendered sprites *are* smoothly animated, adding a modern touch to the classic character.

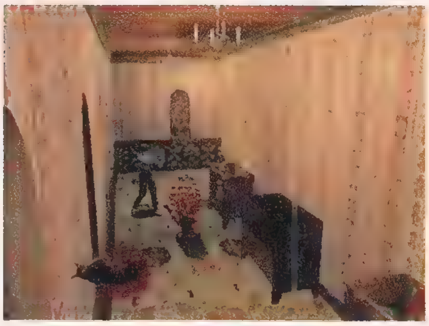
New and unfortunate additions to *Atomic Bomberman* are the appallingly banal "taunts." Worst of all is the inability to turn them off. And the music is a routine techno concoction. Despite these mild failures, gameplay—which has always been the mainstay of the *Bomberman* series—remains intact.

With its fast action, *Atomic Bomberman* is a great multi-player game. Jaded PC gamers might find little reason to drag themselves away from their bloody *Quake* death-matches, but *Atomic Bomberman* delivers where it counts: A classic title with addictive gameplay.

—Dan Simpson

Price $35
Developer/Publisher Interplay
Phone 800.468.3772
URL www.interplay.com

boot verdict 7



You'd best beware, 'cause zombies are everywhere—especially in Virgin's Resident Evil.

Resident **Evil**

Trapped in a mansion, surrounded by evil

TRY IT ON THE DISC

Capcom's battle against the bio-engineered undead—complete with the Japanese version's unedited gore and adding the latest in 3D technology—*could* have been the PC's opportunity to kick consoles in the nards.

Controlling your texture-mapped polygon character in a pre-rendered cinematic fashion, you explore *Resident Evil's* seemingly deserted Victorian house, find weapons, and dispatch countless undead creatures and mutated monstrosities with extreme prejudice.

The game requires either a Rendition, 3Dfx, PowerVR, or Matrox Mystique card, and is playable in either 320x240 or 640x480 resolutions, but the 2D backgrounds have not been re-rendered at the higher resolution. The result? Pixelated backgrounds as atrocious as the zombies' feeding habits. Out of all the versions we played, the PowerVR/PCX-2 version played at the highest framerate, matching the PlayStation's 24+fps bloodfest.

Under other accelerators, *Resident Evil* bogs down under SVGA, running in the low to mid teens on even the mightiest of systems. Drop the resolution and it comes close, but still doesn't match the PlayStation's framerates. *Resident Evil's* polygon graphics look great with bilinear filtering, and the atmosphere is spooky, sure enough, but when a 3Dfx card can't compete with a console, well then, Skippy, it's time to check the code.

— Andrew Sanchez

Price $40
Developer Capcom
Publisher Virgin Interactive
Phone 800.874.4607
URL www.vie.com

boot verdict 3

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-- Fortune

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Product Information Number 187

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- 1.44 MITSUMI/PANASONIC Floppy Drive
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- 104K WIN95 ENHANCED KEYBOARD
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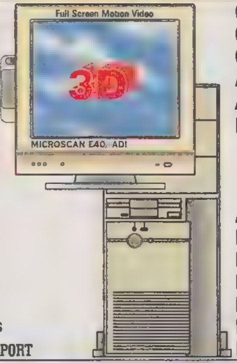

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Pentium 200Mhz MMX	349	379	399
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Cx6x86 PR200 MX	249	269	289
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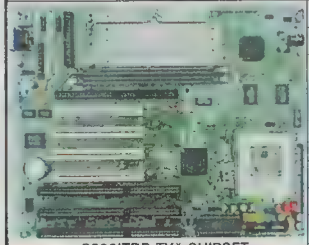

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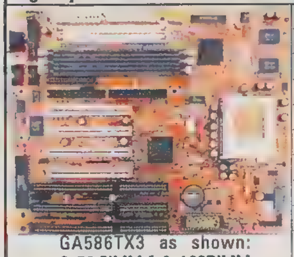

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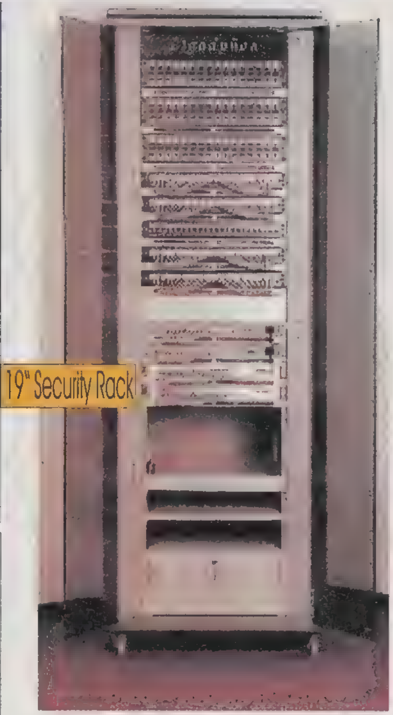

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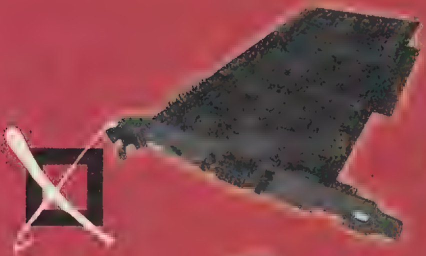

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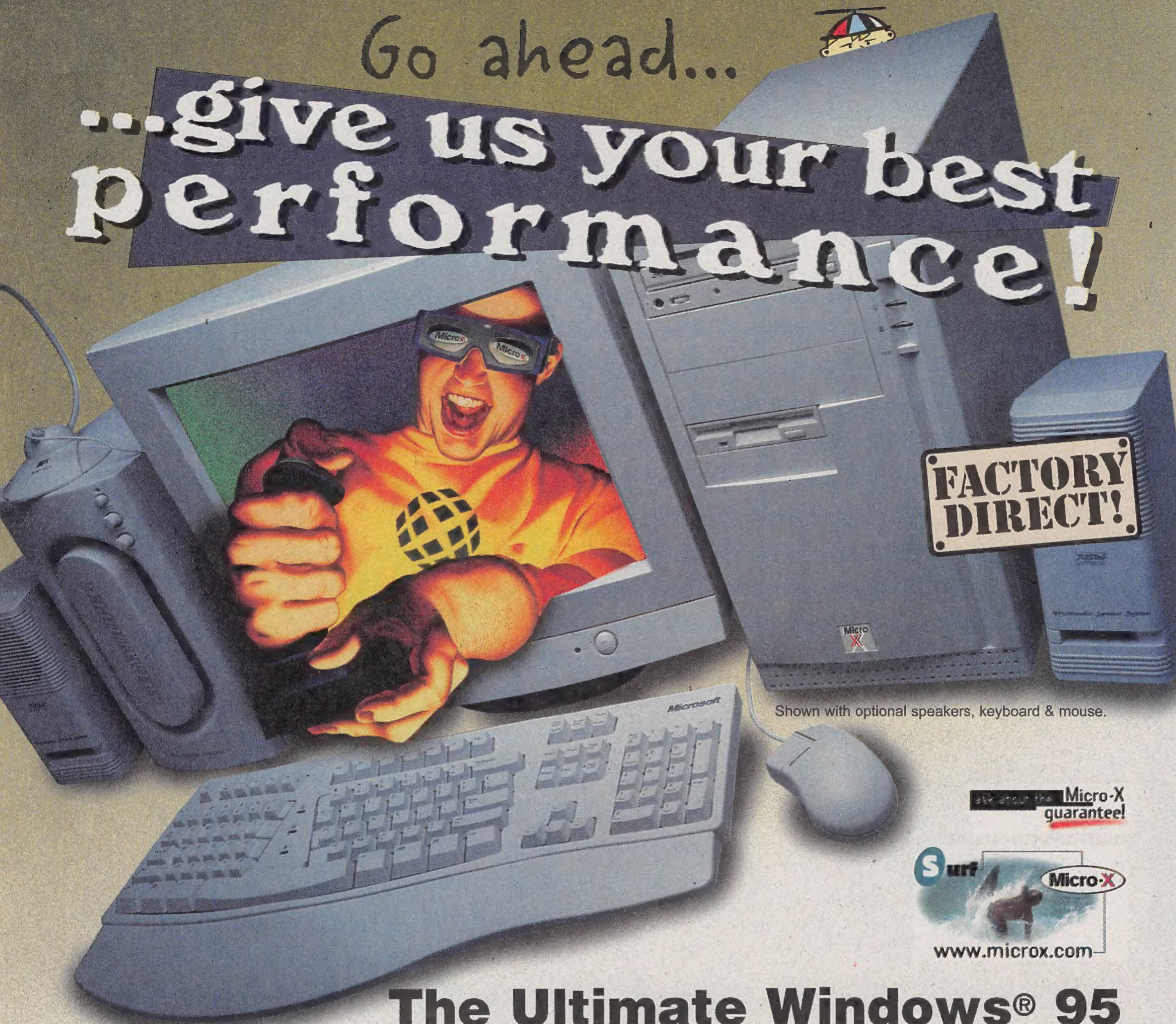

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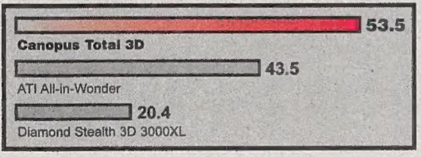
3D Graphics WinMarks
(Source: PC Magazine, June 24, 1997)



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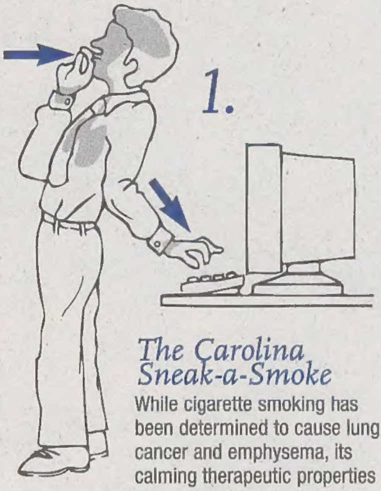
NEW COMPUTER ERGONOMICS

Stretching for fun and safety...lest your machine slowly kill you

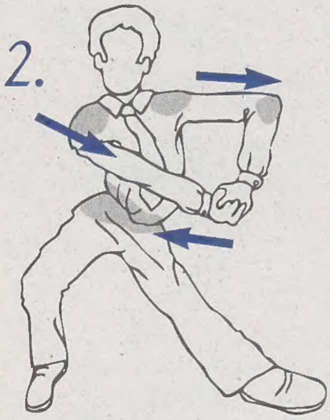
Achy forearms? Sore back? Stiff neck? These are the symptoms of poor computer ergonomics. Unless you periodically stretch your muscles and shift positions during the work day, poor computer ergonomics will eventually lay waste to your entire anatomy. But it doesn't have to be that bad. The primer below illustrates proper ergonomics for today's computer professional. Get cracking—and for extreme discomfort never rule out Dilaudin, because it worked wonders for the seedy hipsters in "Drugstore Cowboy" (until all that bad stuff started happening).



1.

The Carolina Sneak-a-Smoke

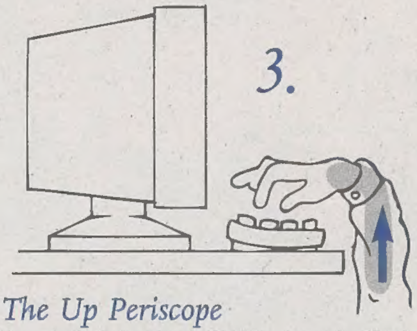
While cigarette smoking has been determined to cause lung cancer and emphysema, its calming therapeutic properties cannot be discounted. The Carolina Sneak-a-Smoke relieves workaday stress, and turns cramped forearm tendons into whips of loose flagellum.



2.

The Tommy Boy

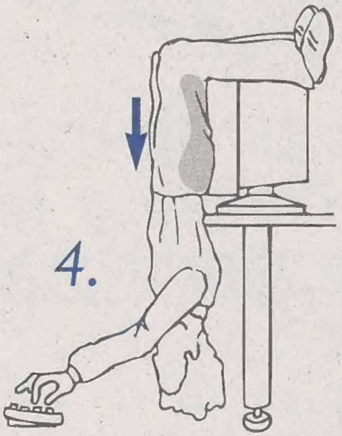
Work that body, work that body, make sure you don't hurt nobody. The American Medical Association has determined that dancing in the work place not only stimulates endorphins and mitigates repetitive stress injuries, but also relieves co-workers who always thought you were a spy from Human Resources.



3.

The Up Periscope

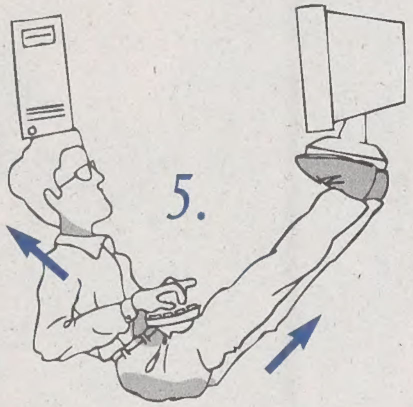
Hey, what's that ruckus in Old Man Jensen's office? You'll never know, because you're underneath your desk, stretching your shoulder muscles, and getting *real* work done without the hub-bub of workplace distractions. A definite productivity booster—and possible life-saver should that disgruntled former employee leave Old Man Jensen's office, and begin taking out cube grunts with his 12-gauge shottie.



4.

The Bun Warmer

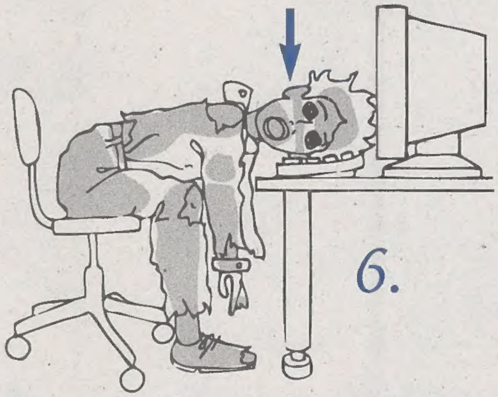
So your ass hurts. Big deal. You've been sitting on it all day. Try a different position, and while you're at it, warm those buns. The Bun Warmer shoots therapeutic ELFs right into your ass. Try getting a joyride like that in a Phnom Penh betting parlor.



5.

The Jungle Jim

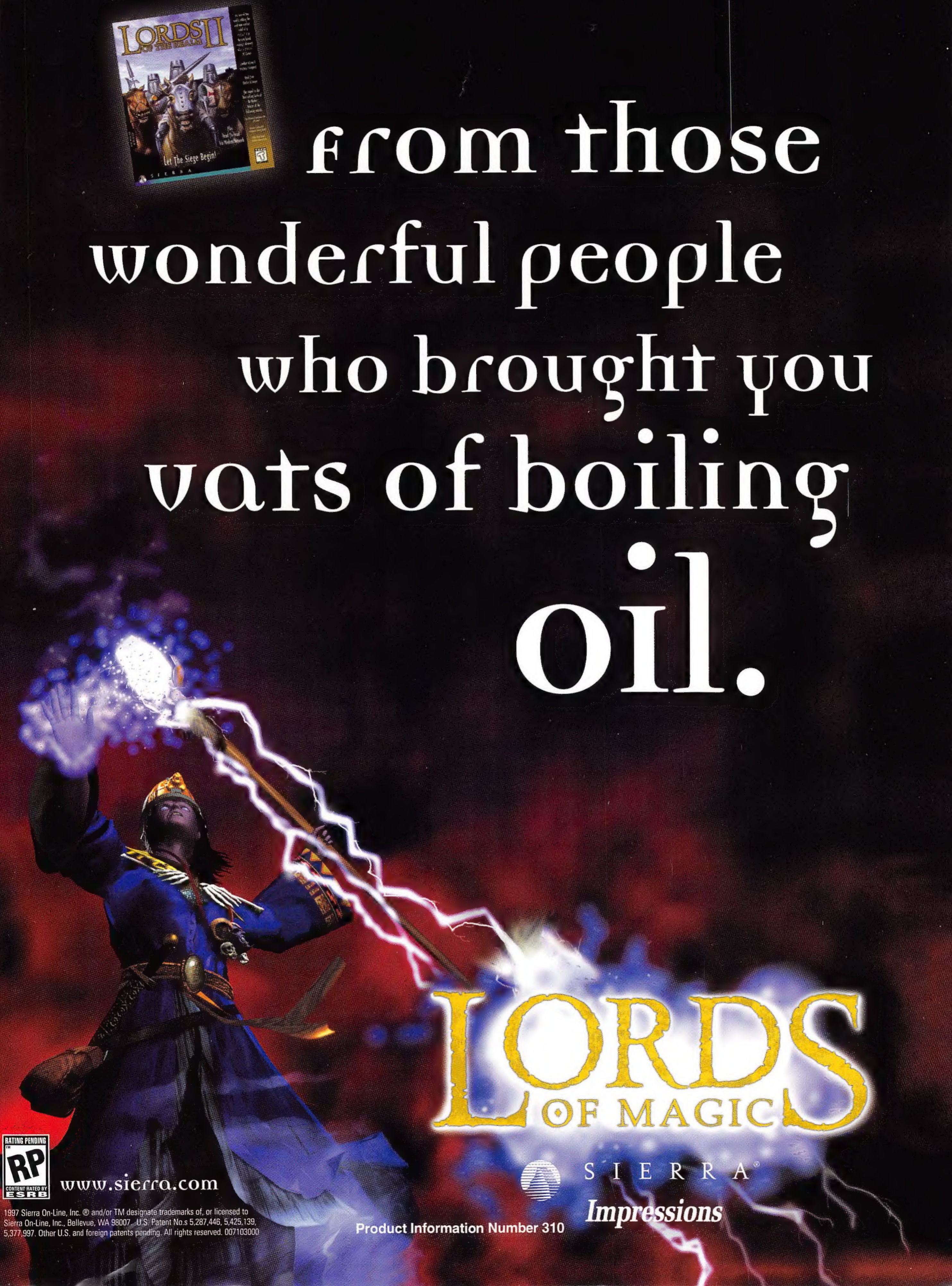
Easy now. Easy. Take a deep breath. Easy. Easy. Easy. Easy. Now take another deep breath and relax. Feel better? Few people can properly execute The Jungle Jim, but those who can? Well, brother, you just better watch out.



6.

The Bataan Beddie-Bye

Work is hell. It destroys your soul, corrodes your morals, and leaves your psyche in tatters. Its physical toll can be exacting as well. Take a nap. You need it.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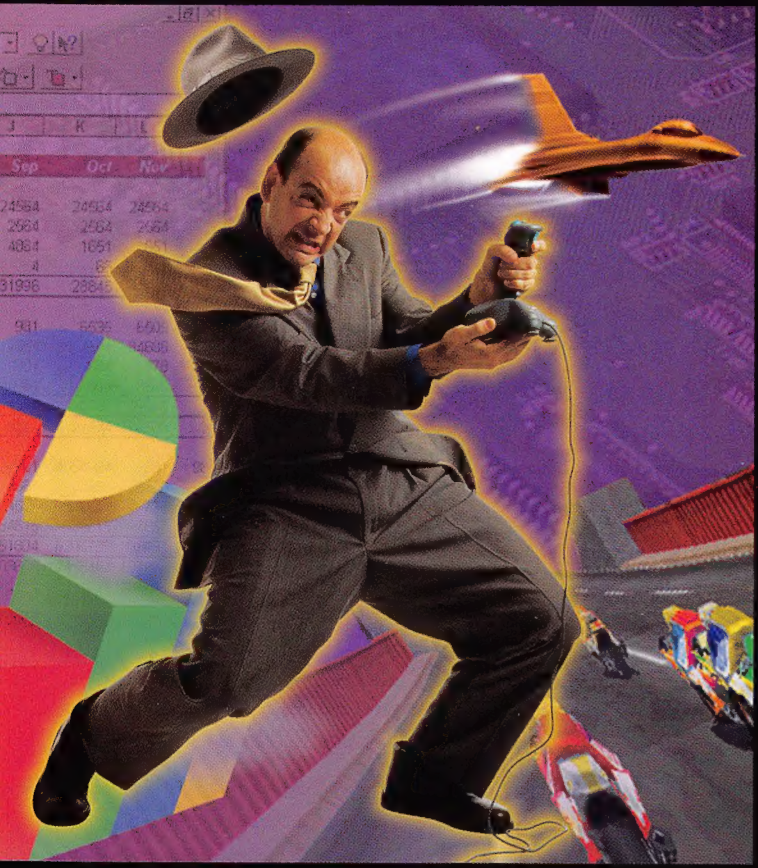

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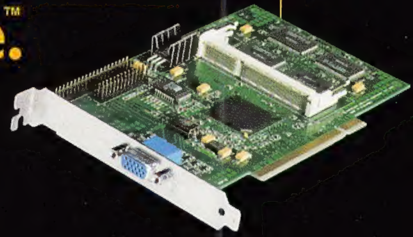

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